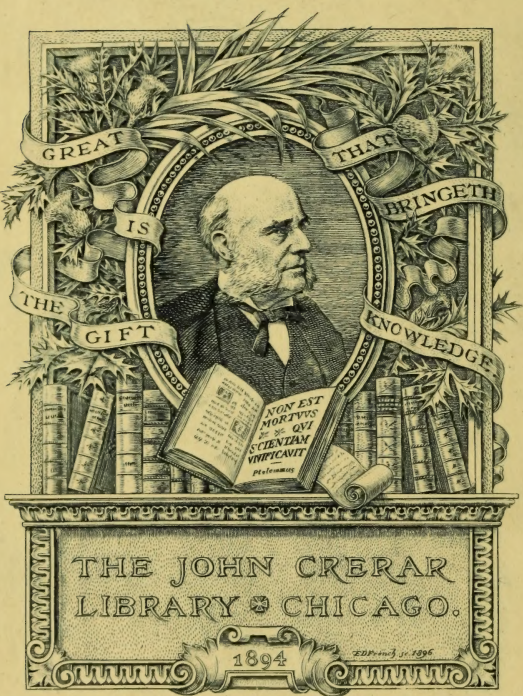
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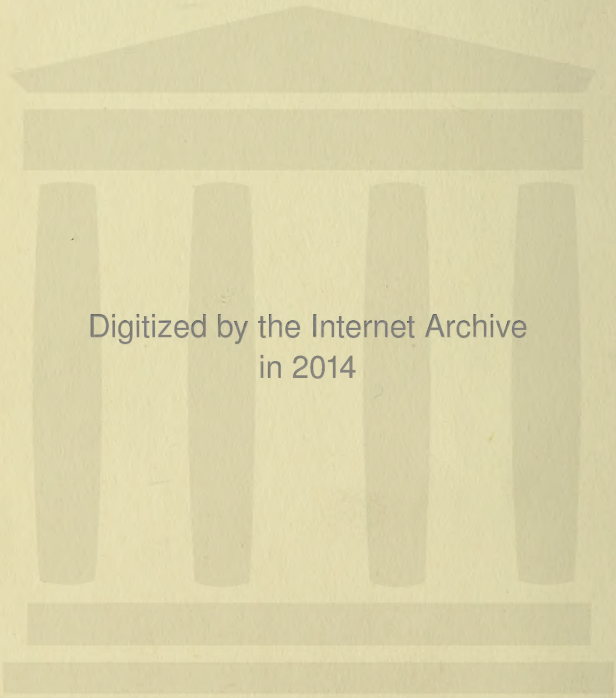

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Union College Bulletin

Vol. II NOVEMBER 1908 No. 1

University Catalogue Number

1908-1909

UNION COLLEGE
SCHENECTADY, NEW YORK

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Correspondence

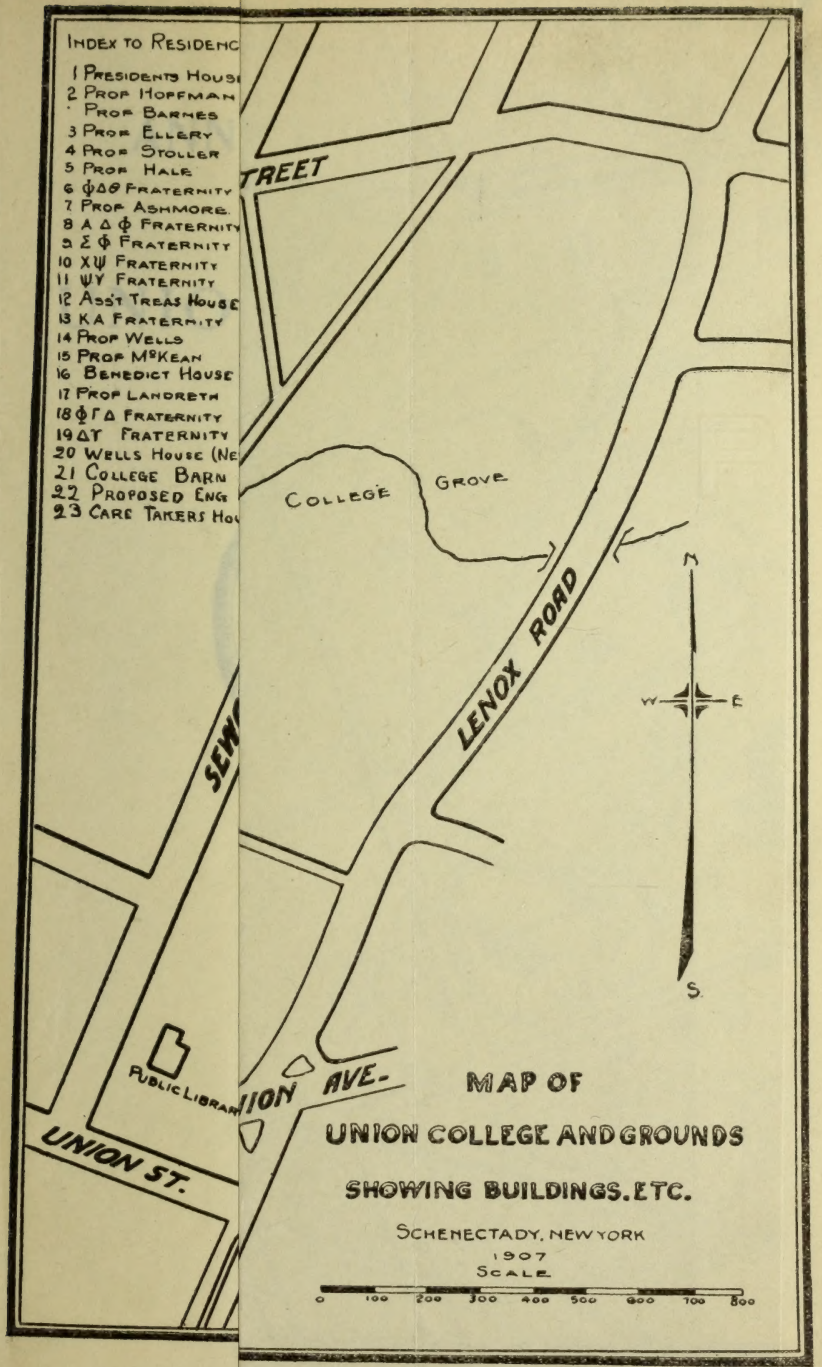
Correspondence addressed simply to Union College, Schenectady, New York, may be expected to reach the proper department, but in order to avoid delay, correspondents are requested to note the following suggestions:

Communications relating to administrative matters and correspondence bearing upon the general interests of the College should be addressed to the President.

Inquiries concerning scholarships and other matters pertaining to undergraduates or to undergraduate work, and correspondence concerning graduate work should be addressed to the Dean.

Requests for the annual catalogue and other publications, inquiries relating to the admission of undergraduate students, and inquiries or information concerning alumni should be addressed to the Secretary of the Faculty.

Communications relating to any of the professional schools in Albany should be addressed to that school.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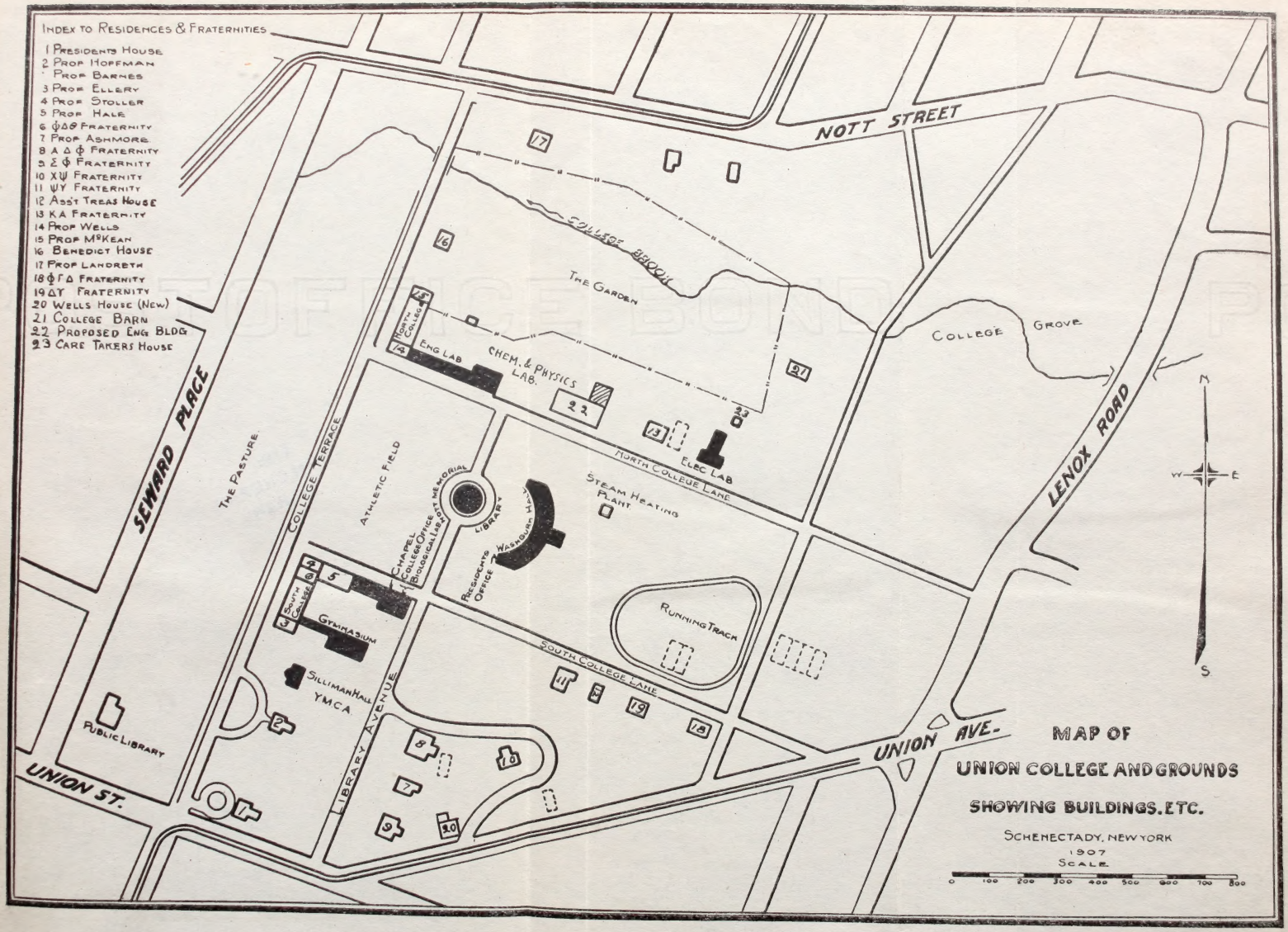
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THE GARDEN
COLLEGE GROVE
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ELEC LAB
STEAM HEATING PLANT
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BIOLOGICAL LAB
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WASHBURN HALL
PRESIDENTS OFFICE
NORTH COLLEGE
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OF

UNION UNIVERSITY

1908-1909

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UNION UNIVERSITY

1908—UNIVERSITY CALENDAR—1909

1908	
14 Sept.	Fall term of Union College begins
22 Sept.	Registration for first semester of the Law School
22 Sept.	Winter term of Medical College begins
5 Oct.	Winter term of College of Pharmacy begins
3 Nov.	Election Day—Recess
28 Nov.	Thanksgiving Day—Recess
22 Dec.	Fall term of Union College ends
	Christmas Recess in all departments
1909	
4–6 Jan.	Sessions resumed in all departments
28 Jan.	Day of Prayer for Colleges
29 Jan.	First semester of Law School ends
8 Feb.	Second semester of Law School begins
22 Feb.	Washington's Birthday—Recess
20 March	Winter term of Union College ends
22 March	Spring term of Union College begins
9–12 April	Easter Recess
6–9 June	Commencement week, Union College
10–11 June	Entrance Examinations, Union College
13 Sept.	Fall term of Union College begins
21 Sept.	Registration for first semester of Law School
21 Sept.	Winter term of Medical College begins
4 Oct.	Winter term of College of Pharmacy begins
2 Nov.	Election Day—Recess
25 Nov.	Thanksgiving Day—Recess
22 Dec.	Fall term of Union College ends

For calendars of departments, see Pages 24, 169, 182, 193

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UNION UNIVERSITY

Union University embraces the following institutions:

UNION COLLEGE, Founded 1795

Academic Department
- Classical Course
- Latin Scientific Course
- Scientific Course

Engineering School (Founded 1845)
- General Engineering Course
- Sanitary Engineering Course
- Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838
ALBANY LAW SCHOOL, Founded 1851
DUDLEY OBSERVATORY, Founded 1852
ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not found practicable. Schools of Law and Medicine and also an Astronomical Observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and Board of Trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the Board of Governors, June 21, 1881, and incorporated as a department of the University, August 21 of the same year.

The President of Union College and permanent Chancellor of Union University has the oversight of the University, each of the institutions having its resident Dean. The Dean of Union College acts in the place of the President in his absence, and also assists him in matters delegated to him by the President. The University Board of Governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

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COLLEGE CALENDAR

1908

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Sept.	6	7	8	9	10	11	**12**
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1909

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Sept.	5	6	7	8	9	10	**11**
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Oct.	3	**4**	**5**	**6**	**7**	**8**	**9**
	10	**11**	**12**	**13**	**14**	**15**	**16**
	17	**18**	**19**	**20**	**21**	**22**	**23**
	24	**25**	**26**	**27**	**28**	**29**	**30**
	31	..	..	..	..	..	..
	..	..	..	..	..	..	..
	..	**1**	2	**3**	**4**	**5**	**6**
Nov.	7	**8**	**9**	**10**	**11**	**12**	**13**
	14	**15**	**16**	**17**	**18**	**19**	**20**
	21	**22**	**23**	**24**	25	26	27
	28	**29**	**30**	..	..	..	..
	..	..	..	..	..	..	..
	..	..	..	**1**	**2**	**3**	**4**
Dec.	5	**6**	**7**	**8**	**9**	**10**	**11**
	12	**13**	**14**	**15**	**16**	**17**	**18**
	19	**20**	**21**	**22**	23	24	25
	26	27	28	29	30	31	..

Figures in heavy type indicate days on which Union College is in session.

UNION COLLEGE

ACADEMIC DEPARTMENT

UNION COLLEGE CALENDAR

1908	
12 Sept.	Examination for conditioned students
14 Sept.	Registration Day for Freshmen
16 Sept.	Registration Day for Students other than Freshmen
17 Sept.	First Chapel Exercises and Recitations Entrance Examinations concluded
18 Sept.	Freshman Recitations begin Y. M. C. A. Reception to Entering Students
3 Nov.	Election Day
26 Nov.	Thanksgiving Day, Recess of four days
5 Dec.	Examination for conditioned students
22 Dec.	Fall term ends
1909	
4 Jan.	Registration Day for Students, winter term
5 Jan.	Recitations begin
28 Jan.	Day of Prayer for Colleges
13 Feb.	Allison-Foote Prize Debate between the Literary Societies
22 Feb.	Washington's Birthday
6 March	Examinations for conditioned students
20 March	Winter term ends
22 March	Registration Day for Students, spring term
23 March	Recitations begin
9–12 April	Easter Recess
15 April	Selection of Junior and Sophomore Prize Orators
1 May	Examination for conditioned students
15 May	Date for Presentation of Prize Essays
21 May	Senior Examinations end
30 May	Memorial Day
6 June	Sunday. Baccalaureate Sermon
7 June	Prize Contest in Extemporaneous Speaking and Prize Oratory of Juniors and Sophomores
8 June	Meeting of Trustees, Phi Beta Kappa, Sigma Xi, Alumni
9 June	Commencement, second Wednesday in June President's Reception
10–11 June	Entrance Examinations

UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the State, and the first north of the city of New York and west of the Hudson River. It received its name from the circumstance that several religious denominations co-operated in its organization, and was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Jonathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, and resigned at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the College, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim,* and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim.*

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Instructor in Engineering Drawing

DEWITT CLINTON
Librarian

PUTNAM CADY, D. D., F. R. G. S.
Lecturer

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MUSIC—Professors McKean, Ellery, Ferguson

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SOPHOMORE CLASS—Professors March, Bennett, Instructor Cunningham

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Secretary of the Faculty
Room 1, Washburn Hall

JAMES H. STOLLER, PH. D.
Curator of the Museum

DEWITT CLINTON
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COURSES OF STUDY

[For curriculum of the undergraduate courses for the year 1908-1909, see pages 77-82 and pages 122-131]

1. Courses leading to the degree of A. B.

COURSE A.—Greek, as indicated on p. 46, is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. French and German are included, in addition to the ancient languages.

COURSE B.—This course may be pursued by candidates who satisfy the requirements for admission to the Ph. B. course. Greek is begun on entrance and required for four years. In other respects Course B is virtually identical with Course A.

2. Course leading to the degree of Ph. B.

This course offers Latin without Greek, for which is substituted additional work in modern languages and Science.

3. Course leading to the degree of B. S.

This course is based upon the study of Mathematics and the Sciences, with extended work in English and other modern languages.

In courses 1, 2 and 3 the greater part of the work of the last two years is elective.

4. General Engineering course of four years leading to the degree of B. E.

This course offers the foundation of a broad Engineering Education, comprising Mathematics, the Sciences, the fundamental principles of the special branches of the profession, some training in History and Economics, a knowledge of

both French and German and a course in English. During the third and fourth years two alternative options are offered in this course:

Option A.—In which the fundamental principles of advanced technical subjects receive emphasis.

Option B.—In which studies are offered which lead to a training for engineering positions of an executive or administrative nature.

5. General Engineering course of six years leading to the degrees of B. E. and Ph. B.

This course combines the above four-year Engineering course No. 4, including both its options, with the Latin Scientific course, No. 2. The subjects of the two courses are interwoven throughout each term and the course thus offers in carefully arranged form a combined college and technical training.

6. Sanitary Engineering course leading to the degree of B. E.

This differs from course 4 in substituting special work in Sanitary Engineering for some of the General Engineering studies.

7. Electrical Engineering course leading to the degree of B. E.

This course is intended to give a broad and thorough Engineering education, wiith the specific instruction requisite for Electrical Engineering.

8. Graduate course in General or in Sanitary Engineering leading to the degree of M. C. E.

This course of one year's graduate study, consists of lectures, laboratory and research work, and is open to graduates

of the General or the Sanitary Engineering course of Union College, or of any other institution of a standing recognized by the Faculty.

9. Graduate course in Electrical Engineering leading to the degree of M. E. E.

This course of one year's graduate study consists of lectures, laboratory and research work, and is open to graduates of the Electrical Engineering course of Union College, or of any other institution of a standing recognized by the Faculty.

Students having the profession of Medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the first two terms of the Senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

For tuition charges, see page 138.

ADMISSION

General Conditions

The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Monday, Wednesday and Thursday of the first week of the Fall term, as indicated in the calendar.

All candidates will be examined in the English requirements, and all candidates for admission to the B. S. course or to any one of the B. E. courses will be examineed in Plane Trigonometry.

Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board, which are held annually in many places. Information concerning the time and place for these examinations can be obtained by writing to *College Entrance Examination Board, Post-office Sub-Station* 84, *New York, N. Y.*

A college entrance diploma issued by the New York State Education Department will be accepted so far as it covers the requirements for admission, except in Trigonometry.

Except in English and Trigonometry, certificates from schools approved by the Faculty will be accepted, if they cover the requirements. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the Secretary of the Faculty. Students who enter the Freshman class by certificate and fail to maintain their class standing cannot enter the next Freshman class, except by passing the entrance examinations in the departments in which they have failed.

Candidates must be at least sixteen years old, and, as a preliminary to the entrance examinations, they must present to the President satisfactory testimonials of character, and register (see pages 44-45) for the necessary examinations.

Candidates from other colleges must bring letters of honorable dismissal, and must pass satisfactory examinations, or present acceptable certificates.

Candidates for a degree must enter before the close of the first Senior term.

Requirements for Examination in 1909

1. A. B. Courses

Course A.—Candidates for admission to the Freshman class in Course A. leading to the degree of A. B. will be examined in subjects Nos. 1, 2, 3, 5, 8, 9 and 10, of the list of subjects specified on pages 37-43.

Course B.—Candidates for admission to the Freshman class in Course B. leading to the degree of A. B. will be examined in subjects Nos. 1, 3, 4, 5, 8, 9 and 10, of the list of subjects specified on pages 37-43.

2. Ph. B. Course

Candidates for admission to the Freshman class in the course leading to the degree of Ph. B. will be examined in subjects Nos. 1, 3, 4, 5, 8, 9 and 10, of the list of subjects specified on pages 37-43.

3. B. S. Course

Candidates for admission to the Freshman class in the course leading to the degree of B. S. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8, 9 and 10, of the list of subjects specified on pages 37-43.

For admission to this course, Latin (No. 3) may be offered, instead of a modern language (No. 4), if desired.

4, 5, 6, 7. B. E. Courses

Candidates for admission to the Freshman class in any one of the four year courses leading to the degree of B. E. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8, 9 and 10, of the list of subjects specified on pages 37-43.

Candidates for admission to the Freshman class in the six year course leading to the degree of B. E. and Ph. B. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8, 9 and 10, and also Latin (No. 3), of the list of subjects specified on pages 37-43.

Lists of Subjects

See preceding page.

1. English

All candidates for admission to the Freshman class will be required to pass a written examination in English, and no candidate will be admitted whose work is seriously defective in spelling, punctuating, grammar, or division into paragraphs.

Questions will be set on topics and extracts drawn from the following books. The first list consists of works to be read carefully, with a view to the absorption of the subject matter, *i. e.* as books are generally read. The second list consists of books to be read with critical care, in annotated editions, and with reference to dictionary, grammar and rhetoric. The questions on this set will relate to literary form and logical structure, as well as to substance.

List (1) *for General Reading*

Nine books are to be selected as follows:—

Group I (two to be selected)

Shakespeare's "As You Like It," "Henry V," "Julius Cæsar," "The Merchant of Venice," "Twelfth Night."

Group II (one to be selected)

Bacon's "Essays;" Bunyan's "The Pilgrim's Progress," Part I; "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography."

Group III (one to be selected)

Chaucer's' "Prologue;" Spenser's "Faerie Queene" (selections); Pope's "The Rape of the Lock;" Goldsmith's "The Deserted Village;" Palgrave's "Golden Treasury"

(First Series) Books II. and III., with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected)

Goldsmith's "The Vicar of Wakefield;" Scott's "Ivanhoe;" Scott's "Quentin Durward;" Hawthorne's "The House of the Seven Gables;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" Dickens' "A Tale of Two Cities;" George Eliot's "Silas Marner;" Blackmore's "Lorna Doone."

Group V (one to be selected)

Irving's "Sketch Book;" Lamb's "Essays of Elia;" De Quincey's "Joan of Arc" and "The English Mail Coach;" Carlyle's "Heroes and Hero Worship;" Emerson's "Essays" (Selected); Ruskin's "Sesame and Lilies."

Group VI (two to be selected)

Coleridge's "The Ancient Mariner;" Scott's "The Lady of the Lake;" Byron's "Mazeppa" and "The Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series) Book IV, with especial attention to Wordsworth, Keats and Shelley; Macaulay's "Lays of Ancient Rome;" Poe's "Poems;" Lowell's "The Vision of Sir Launfal;" Arnold's "Sohrab and Rustum;" Longfellow's "The Courtship of Miles Standish;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine," and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Evelyn Hope," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "The Boy and the Angel," "One Word More," "Hervé Riel," "Pheidippides."

List (2) for Minute and Critical Study

Shakespeare's' "Macbeth;" Milton's "Lycidas," "Comus," "L'Allegro," and "Il Penseroso;" Burke's "Speech on

Conciliation with America," or Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

Attention is called to the fact that while no examination in grammar or rhetoric, as such, will occur, yet a knowledge of the essential principles of grammar and of the elementary principles of rhetoric is involved in the above requirements. An acquaintance with the general outline of the development of English literature will also be required. Newcomer's "Introduction to English Literature" and Moody and Lovett's "First View of English Literature" are recommended.

2. Greek

(a) Goodwin's Greek Grammar; Pearson's "Greek Prose Composition," or an equivalent; Xenophon's "Anabasis," four books; Homer's "Iliad," three books, including Prosody.

(b) Greek History.

(c) The Geography of Ancient Greece.

[The attention of instructors is particularly directed to the student's need of a full and accurate knowledge of the Greek and the Latin Grammar.]

3. Latin

(a) In addition to the usual first year (elementary) Latin of the high school course, which includes Latin (prose) writing, the following authors (or parts of authors) are required: Four books of Caesar's Gallic War, six books of Vergil's Æneid, and six orations of Cicero. Equivalents will be accepted at the discretion of the head of the department. These requirements presuppose a four-year course, either at the public high school or at an approved school of similar standing. A student who has been otherwise prepared will be expected to be proficient also in two thousand lines of Ovid and in Sallust's "Catiline"

or "Jugurtha." Every student is required to use in the College class room the "Roman Method" of pronunciation, and is expected to have had practice in this method at school.

The grammars of Allen and Greenough (new), Harkness (complete), Gildersleeve-Lodge, Bennett, Lane and Morgan, and West, are recommended.

(b) Roman History (e. g., Botsford's).

(c) Geography of the Roman Empire.

N. B.—This includes the geography of the ancient Greek world.

4. Modern Languages

Either

German—A knowledge of grammar, comprising declension of nouns, adjectives and pronouns; conjugation of verbs; the rules of syntax and word order; a good facility in correct pronunciation and the ability to write from dictation.

Ability to translate at sight a passage of German prose or poetry of ordinary difficulty, and to convert simple English sentences into German. The candidate must have read from 300 to 400 pages of prose and poetry from various standard authors. Two years' work will ordinarily be necessary to meet this requirement.

Or

French—A knowledge of grammar, comprising the forms of nouns, adjectives and pronouns; conjugation of verbs; the rules of syntax; the more common idioms; a good facility in correct pronunciation and the ability to write from dictation.

Ability to translate at sight a passage of modern French prose or poetry of ordinary difficulty, and to convert into French simple English sentences founded upon it. The candidate must have read from 300 to

400 pages of prose and poetry from various standard authors. Two years' work will ordinarily be necessary to meet this requirement.

The following outline is suggested as indicating the scope of the above requirements:

In German—

1st year
- Joynes-Meissner German Grammar, Part I
- Joynes' German Reader, Pages 23-128

2d year
- Joynes-Meissner German Grammar, Part III
- Three or more works of narrative prose fiction and Schiller's Wilhelm Tell

In French—

1st year
- Whitney's French Grammar, Part I
- Super's French Reader

2d year
- Whitney's French Grammar, Part II
- Three to four works of narrative prose fiction
- Three to four modern plays

5. Mathematics a

Arithmetic; Algebra, including Quadratic Equations, Proportions, Progressions and Logarithms; Plane Geometry.

In Arithmetic the examination will be on the following subjects: factors and multiples, common and decimal fractions, square root, the more important tables and operations of denominate numbers, percentage and simple interest, compound interest for integral periods only, bank discount, stocks and bonds, and the metric system.

In his preparation in Algebra the candidate should give special attention to factoring, fractional exponents and radicals, and the solution of quadratic equations by factoring and by the formula resulting from the solution of the equation $ax^2+bx+c=o$.

6. **Mathematics b**

   Solid Geometry and Plane Trigonometry. No certificate covering the requirement in Plane Trigonometry will be accepted.

7. **Physics**

   An elementary knowledge of Physics, such as may be gained by a year's course of study covering Mechanics, Sound, Heat, Light and Electricity, as treated in any standard High School text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

8. **History of the United States**

9. **Modern Geography**

10. **Physiology**

Requirements for Examination in 1910 are the same as in 1909.

Entrance Examinations

1909

Entrance examinations will be held at the college **in June** and in **September,** in accordance with the schedule given below.

Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 10

9 A. M. Candidates will present their credentials at the office of the President and register for examination.

11 A. M. to 1 P. M.	Algebra
	Physiology
2 P. M. to 4 P. M.	U. S. History
	Physics
3 P. M. to 5 P. M.	English

Friday, June 11

9 A. M. to 11 A. M.	Latin
	Solid Geometry
11 A. M. to 1 P. M.	German
	French
2 P. M. to 4 P. M.	Greek
	Plane Geometry
	Plane Trigonometry

Schedule of the September Examinations

Monday, September 13

9 A. M. and 2 P. M. Candidates will present their credentials at the office of the President and register for examination.

Wednesday, September 15

9 A. M. to 11 A. M.	Physics
	Physiology
11 A. M. to 1 P. M.	Algebra
2 P. M. to 4 P. M.	U. S. History
3 P. M. to 5 P. M.	English

Thursday, September 16

9 A. M. to 11 A. M.	Latin
	Solid Geometry
11 A. M. to 1 P. M.	German
	French
2 P. M. to 4 P. M.	Greek
	Plane Geometry
	Plane Trigonometry

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT

In Course A, leading to the degree of Bachelor of Arts, Greek is required during the Freshman and Sophomore years, and may be elected during the Junior and Senior years; in Course B, leading to the degree of Bachelor of Arts, Greek is begun on entrance and required for four years.

1. **Greek Grammar; Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phaedo; **Aristophanes:** The Clouds.
   Required of Freshmen in Course A. Four hours weekly throughout the year.

2. **The Elements of Greek**
   Required of Freshmen in Course B. Four hours weekly throughout the year.

3. **Aeschylus:** Prometheus Vinctus; **Sophocles:** Oedipus Tyrannus; **Euripides:** Medea; **Herodotus: Homer.**
   Required of Sophomores in Course A. Three hours weekly throughout the year.

4. **Xenophon:** The Anabasis
   Required of Sophomores in Course B. Three hours weekly throughout the year.

5. **Homer; Thucydides**
   Elective for Juniors in Course A. Two hours weekly throughout the year.

6. **Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phaedo.
   Required of Juniors in Course B. Two hours weekly throughout the year.

7. **Aeschines:** Against Ctesiphon; **Demosthenes:** De Corona; **Theocritus.**

Elective for Seniors in Course A. Two hours weekly throughout the year.

8. **Homer**

Required of Seniors in Course B. Two hours weekly throughout the year.

Note: The above courses are typical only. The books read are varied from year to year.

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9. **Honors:** Candidates for honors in Greek, either in A. B. Course A. or in A. B. Course B, will be required to take all the work in Greek offered in their respective courses, to maintain a general average of ninety per cent. in that work, to meet for two additional hours a week during the first two terms of the Senior year for the study of a Greek text, and to write theses on assigned subjects.

The Latin Language and Literature

PROFESSOR ASHMORE

The studies of this department are required, in the Freshman and Sophomore years, of all students who are candidates for either one of the two degrees, A. B. and Ph. B. In the Junior and Senior years Latin becomes an elective study, except for students who are candidates for Honors in Latin; of these it is required:

1. **Livy:** Book I or an equivalent; Roman History.—**Tacitus:** Agricola and Germania.—**Cicero:** De Senectute or De Amicitia. Latin Composition.

Required of Freshmen in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

2. **Horace:** Selected Odes and Epodes.—**Terence:** One or more of the plays. Lectures on Ancient Comedy.—**Plautus:** Captivi or an equivalent.

Required of Sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Juvenal** and **Horace:** Satires. History of Roman Literature. Lectures on Archaeological Topics.—**Pliny the Younger** or **Martial** or **Cicero:** Letters. Private Life of the Romans.

Elective for Juniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

4. **Lucretius:** Selections. Lectures on the Atomic Theory and the Philosophy of Epicurus.—The literature of the Empire: **Suetonius** or **Seneca** or **Quintilian** or **Tacitus.**—Early Latin or some subject especially suited to students intending to become teachers.

Elective for Seniors in the A. B. and Ph. B. Courses. Two hours weekly throughout the year.

Note: In general subsidiary reading will be recommended all along the line. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years, if the head of the department should deem it advisable.

4a. **Honors:**. Candidates for special honors are required to take the Latin of the four years, to do additional reading in private, as indicated by the head of the department, and to prepare a thesis on some topic directly related to the work of the class room or to the additional reading referred to.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH
AND INSTRUCTOR SMITH

German

The courses aim to give a ready reading knowledge of German and a general acquaintance with its literature. While the literary side of the work receives chief attention after the first year, the practical is also kept in view and the study of grammatical topics and colloquial German, together with practice in writing, forms a part of every course. German is made the language of the class room whenever practicable and in some sections is used exclusively.

1. **Elementary.** Grammar study: with exercises and supplementary composition; reading and memorizing; use of German in class. Harris's German Reader and selections on popular scientific subjects.

   Required in all courses of Freshmen who offer French at entrance and in the B. S. course of those who offer Latin. Three hours weekly throughout the year.

1a. **Elementary.** Grammar, Reader and Exercises. Schiller: Wilhelm Tell; Goethe: Hermann und Dorothea.

   Required of Sophomores in the A. B. course and of Freshmen as in 1 who have had one year of German in school. Three hours weekly throughout the year.

2. **Intermediate.** Grammar for review and reference; connected composition; use of German in class. The time in class is devoted to the reading and discussion of selected works from the German classics and from recent drama and fiction; matter is also assigned for outside reading with reports and examination on the work done. The work varies somewhat from year to year, but aims to give every class an acquaintance with some

of the masterpieces of German literature and some knowledge of present day German life and institutions.

Required in the Ph. B., B. S. and B. E. courses of Freshmen who offer German at entrance; in the A. B. (B.), Ph. B. and B. S. courses of Sophomores who have had German 1; and in the A. B. course of Sophomores who have had two years of German before entrance. Elective in the A. B. course of Juniors who have had 1a. Three hours weekly throughout the year in the Ph. B. and B. S. (or A. B.) courses and during terms 1 and 2 in the B. E. course.

2a. **Intermediate.** This is a course in the reading of scientific German. A reader consisting of selections on scientific subjects forms the basis of the work and is supplemented by one or more monographs on technical subjects within the grasp of the class at this stage of its work.

Required during the third term, of B. E. members of German 2. Three hours weekly through the term.

3. **Advanced.** Nineteenth century drama, development and leading representatives. Readings from Von Kleist and Grillparzer. Das junge Deutschland; assigned study. Readings from Hebbel, Ludwig and Von Wildenbruch. Die freie Bühne; assigned study. Nineteenth century fiction. Readings from Sudermann, Hauptmann, Meyer, Scheffel and others.

Elective for Juniors in the Ph. B. and B. S. courses who have done 2 and for Juniors in the A. B. course who have done 1a with a grade of 90. Required, as an alternate with French, of Sophomores in the Ph. B. and B. S. courses who in Freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

3a. **Advanced.** Goethe and the classical period, readings and assigned studies. Lessing: Nathan der Weise, Emilia Galotti; Schiller: Wallenstein, Maria Stuart, Jungfrau von Orleans. Outline study of the lives of these writers.

Koch: Geschichte der deutschen Literatur as a handbook, with references to other works.

This course alternates with course 3 and is given under the same conditions.

3b. **Special.** This course is given in three sections: (a) A course in composition and conversation, based on Stern's Geschichten von deutschen Städten or a similar work; (b) A course in commercial German, consisting of reading, correspondence and newspaper work; (c) A course in the reading of historical and political matter, with composition based on the articles read.

This course may be substituted for course 3a, and is given under the same conditions.

4. **Advanced.** Goethe: (1) A study of Goethe's life and works with readings from his autobiography and epic writings: Egmont, Iphigenie auf Tauris, Torquato Tasso. (2) Faust: Part I, reading and interpretation; the Faust legend in literature.

Elective for Seniors in the A. B., Ph. B. and B. S. courses who have had necessary previous training. This course will ordinarily follow course 3. Two hours weekly throughout the year.

4a. **Advanced.** History of German literature: Reading and discussion in class with references to various works, accompanied by Musterbuch and special assignments. Two hours weekly, first half year.

A course in Middle High German: Grammar and reading, supplemented by an outline study of the history of the language. Two hours weekly, second half year.

This course alternates with course 4 and is given under the same conditions. It is expected that those electing it will have had course 3a. It is intended primarily for students who are preparing to teach German.

4b. **Special.** This course consists in the reading of one or more historical monographs and, when time allows, a historical novel, with parallel readings; followed by a careful study of a number of political speeches and parliamentary addresses, with discussion of the topics involved; supplemented by the reading of newspaper reports and editorial articles. The work aims to lay the foundation for future study along these lines and to give some insight into present governmental and social conditions in Germany.

This course may be substituted for course 4a, and is given under the same conditions.

4c. **Honors** Special courses, open only to members in good standing in Senior Elective German, are offered to candidates for honors in this department.

French

A reliable practical knowledge of French is the first result aimed at in all the classes, but as soon as possible the literary side of the language is brought to the front, and good books are read for what they contain. The more advanced courses vary somewhat from year to year, according to the judgment and preference of the instructors, and the ability and character of the students composing the classes.

1. **Elementary.** Grammar and the reading of simple French texts. Constant drill in grammatical forms, common idioms, pronunciation and writing to dictation.

Required of Freshmen in the A. B. course (A); of Freshmen in the A. B. (B), Ph. B. B. S., and B. E. courses who offer German at entrance; and in the B. S. course of those who offer Latin. Three hours weekly throughout the year.

1a. **Elementary.** Grammar reviewed; composition; selected readings of second year or higher grade.

Required in place of French 1 of those who have had one year of French before entrance.

2. **Intermediate.** Grammar reviewed; composition, writing to dictation, and memorizing.

In addition to daily translation in class, easy reading is assigned to be done outside and reported upon. Since this course is for most students the last required French in college, it is devoted to selected works of various periods. The number and character of the books read may vary considerably from class to class.

Required of Freshmen in the Ph. B. and B. S. courses who offer French at entrance; in the A. B. course of those who have had two years of French before entrance. Three hours weekly throughout the year.

2a. **Intermediate.** This course is similar to course 1a.

Required of Sophomores in the A. B. (B), Ph. B. and B. S. courses who have had French 1. Three hours weekly throughout the year.

3. **Advanced.** French literature of the 19th Century. Discussion of various authors and of some phases of modern French life and character; assigned reading; careful translation in class. With suitable classes, attention is paid to French etymologies, and the laws of the evolution of the language.

Elective for Juniors of the A. B., Ph. B. and B. S. courses. Required, as an alternate with German, of Sophomores in the Ph. B. and B. S. courses who in Freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

4. **Advanced.** French literature of the 17th Century.

Selected works of Corneille, Racine, Molière, and La Fontaine, are read carefully in class. Assigned readings, discussions of men, of their work and of the period.

This course may in any year be a continuation of course 3.

Elective for Seniors of the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

4a. **Honors.** Advanced courses, leading to special honors in French, are offered to those students who are qualified to pursue them.

Spanish

This course aims to ground the student in the grammar of modern Spanish and to give a good reading knowledge of the language. Practice in writing is continued throughout the course.

1. **Junior Elective.** Grammar, exercises and reader; practice and sight translation. Selections from Gil Blas, a recent novel and a modern play are read.

   Open to Juniors in the A. B., Ph. B. and B. S. courses and to Seniors who have not had Spanish in Junior year. Three hours weekly throughout the year.

2. **Senior Elective.** Grammar and composition, commercial correspondence and newspaper reading. In connection with a brief survey of the development of Spanish literature, one or two dramas of the classical period and one or two modern plays are read, together with some works of recent fiction. The amount read depends upon the nature of the works selected and the ability of the students composing the class.

   Open to Seniors who have had Spanish 1. Two hours weekly throughout the year.

English Language and Literature

PROFESSOR HALE

1. **Old English.** This course gives an introduction to the language in Cook's First Book in Old English, with especial attention to the phonology and the relations of

Old and Modern English with the other Teutonic languages. In the third term the work is carried on either by a study of Old English poetry in "Beowulf" or by further reading in West Saxon prose, especially the Chronicle.

Elective for Juniors in all courses. Two hours weekly throughout the year.

2. **History of English Literature.** This study is pursued with a text-book for the purpose of giving a foundation knowledge of the facts of English Literature.

Required of Sophomores in the A. B., Ph. B. and B. S. courses. Two hours weekly during the fall and winter terms.

3. **Shakespeare.** A careful reading of "Hamlet," with particular attention to the language, action and characters, and a summary of questions of text, date, and sources. A view is also given of the conditions of the Elizabethan theatre, and the general standpoint taken is that of the acted drama.

Required of Sophomores in the B. E. course during the fall term, and of Sophomores in the A. B., Ph. B. and B. S. courses during the spring term. Three and two hours respectively.

4. **Shakespeare.** A study of plays chosen to represent the different periods of Shakespeare's life and the different forms of the Shakespearean drama. Six plays will be read each year, different plays being chosen each year from those of the year before.

Elective for Seniors and Juniors in all courses. One hour weekly throughout the year.

5. **Modern Poetry.** The study of some great poem of the nineteenth century: in 1908 Tennyson's "Idylls of the King" was the subject.

Required of Sophomores in the B. E. course. Two hours weekly during the winter term.

6. **English Prose.** The course considers especially the novel, the short story and the essay. In each case especial attention is given to the general character of the literary form in question and the specific character of the different authors that can be treated. In the first term Perry's "Study of Prose Fiction" is used: in the other terms the work is carried on without a text-book.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

7. **English Poetry of the Nineteenth Century.** An introduction to the critical study of poetry. Page's "British Poets of the Nineteenth Century" furnishes a collection of texts in which the work may readily be followed. The main plan is to form habits of discrimination, and a poetic taste by distinguishing between the characteristics of the different poets read.

Elective for Seniors in all courses. Two hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors are offered to those students who are qualified to pursue them. In 1907-8 the topic was "Plot: Analysis in the Modern Novel."

Rhetoric and Public Speaking

PROFESSOR MCKEAN

1. **Freshman Rhetoric.** The work is pursued by means of recitations, written exercises, criticisms, discussions and informal lectures.

Required of Freshmen in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

1a. **Freshman Rhetoric.** The work is pursued as in course 1. The instruction, however, is somewhat more technical and scientific in general character than that of course 1.

Required of Freshmen in the B. E. course. Two hours weekly throughout the year.

2. **Sophomore Rhetoric.** The work consists in the writing of orations with criticism and a delivery of them, either in special appointments or before the class, and the writing and criticism of essays.

Required of Sophomores in the A. B., Ph. B., and B. S. courses during the second and third terms, and in the B. E. course throughout the year. One hour weekly.

3. **Junior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all Juniors. One hour weekly throughout the year.

4. **Argumentation and Debate.** The work follows a textbook on the art of debate during the fore part of the year. Following this, considerable practice is given in the preparation of briefs and arguments and in oral debates.

Elective for Juniors in the A. B., Ph. B. and B. S. courses Two hours weekly throughout the year.

5. **Advanced Argumentation and Debate.** The work is like that of course 4, but of a more advanced character.

Elective for Seniors in the A. B., Ph. B. and B. S. courses who have completed course 4.

6. **Senior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all Seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

6a Senior Rhetoric. One literary essay each term.

Required of Seniors in the B. E. course during the fall and winter terms.

History and Sociology

PROFESSOR RIPTON AND DR. POLLOCK

The work of the department covers three years, beginning with the first term of the Sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. **English History.** The narrative history of England is made the basis of study, but especial attention is given to the industrial, commercial and social history of the country, and to the development of the English Constitution. The importance of collateral readings from the English authorities is emphasized.

   Required of Sophomores in A. B., Ph. B. and B. S. courses. Two hours weekly, first and second terms.

2. **French History.** Beginning with a brief study of Roman Gaul, the main purpose is to show the growth of the French nation and the development of the feudal monarchy into the absolute monarchy of the old régime. The period studied concludes with the year 1789. The history of France from that date to the present is taken up in greater detail in Course 4.

   Required of Sophomores in A. B., Ph. B. and B. S. courses. Two hours weekly, third term.

3. **American History.** A study is made of the period of American discovery and exploration and of the colonial period. The main part of the work, however, begins with an examinatiion of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for Juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of Juniors in the B. E. courses. Two hours weekly throughout the year.

4. **French Revolution and Nineteenth Century.** This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. It then takes up an examination of the events and forces which contributed to the unification of Italy and of Germany, and concludes with a brief study of the Eastern Question. The course is designed to give a clear understanding of political affairs as they exist in Europe to-day and the historical process by which they were brought about.

   Elective for Seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

5. **Comparative Politics.** A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of Continental Europe. Sufficient attention is given to historical origins to account for characteristic differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the distribution of governmental powers, and their practical operation, including some account of political parties.

   Elective for Seniors. Two hours weekly throughout the year.

6. **Economics.** It is the design of this course to give instruction in the leading principles of Economics. While a text-book is used in order to secure more rapid progress, still the views of no school are taught exclusively. By lectures and required collateral reading an attempt is

made to present the results of the latest and most approved investigations in the science.

Required of Seniors in all courses. Three hours weekly, first term.

7. **Sociology.** In this course the mutual relations of men in society are examined historically, that the student may learn how present conditions have resulted from past experience. Present social forces and needs are considered, with the purpose of training the students to fulfil the demands of good citizenship. The collateral reading and practical sociological investigation is guided throughout the course by lectures.

Required of Seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. **Honors.** Candidates for Special Honors in History are assigned subjects for study which are designed to give training in historical method and the use of sources.

Mental and Moral Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the Junior year and extend through the entire Senior year. Logic, Elementary Psychology and Elementary Ethics come in the Junior year and are required. All the other courses are taken up in the Senior year and are elective. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. **Logic.** This study, inasmuch as it is required, is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies.

Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

2. **Elementary Psychology.** This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of Psychology to the other sciences is set forth, and the importance of the study is emphasized in that it lays the foundation for all the sciences of man as a political, moral and religious being.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. **Elementary Ethics.** Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. **Advanced Psychology.** The chief problems discussed in this course are the recent views concerning the nature of perception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal Psychology are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. **Advanced Ethics.** Some account of the history of Ethics is given in this course, and present ethical theories are

stated and discussed. The relation of Ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. **Evolution of Religion.** The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. **History of Philosophy.** The attempt is made in this course to go over with considerable detail the general field of Philosophy from the earliest times down to the present day. In this way the views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity of knowledge, the nature of virtue, the foundations of the State and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Mathematics

ASSISTANT PROFESSOR GARIS

Mathematics is required in the A. B., Ph. B. and B. S. courses during the Freshman year and is elective during the Sophomore, Junior and Senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. **Solid Geometry.**

   Required of Freshmen in the A. B. and Ph. B. courses. Four hours weekly during the first term.

2. **Higher Algebra.**

   Required of Freshmen in the B. S. course during the first term, and of Freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

3. **Trigonometry.**

   Required of Freshmen in the A. B. and Ph. B. courses. Three hours weekly during the third term.

4. **Plane Analytic Geometry.**

   Required of Freshmen in the B. S. course. Three hours weekly during the second and third terms.

5. **Theory of Equations.**

   Elective for Sophomores in the A. B. and Ph. B. courses. Two hours weekly during the first term.

6. **Plane Analytic Geometry.**

   Elective for Sophomores in the A. B. and Ph. B. courses. Two hours weekly during the second and third terms.

7. **Solid Analytic Geometry.**

Elective for Sophomores in the B. S. course and for Juniors in the A. B. and Ph. B. courses who have had 6. Two hours weekly during the first term.

8. **Differential Calculus.**

Elective for Sophomores in the B. S. course and for Juniors in the A. B. and Ph. B. courses who have had 7. Two hours weekly during the second and third terms.

9. **Integral Calculus.**

Elective for Juniors in the B. S. course and for Seniors in the A. B. and Ph. B. courses who have had 8. Two hours weekly throughout the year.

10. **Differential Equations.**

Elective for Seniors in the B. S. course who have had 9. Two hours weekly during the first and second terms.

11. **Theory of Functions.**

Elective for Seniors in the B .S. course who have had 10. Two hours weekly during the third term.

12. **Honors.** Candidates will be given advanced work in various subjects suited to their special ability.

Open to Seniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

The required work in Physics extends through the three terms of the Sophomore year. This is followed by electives in laboratory work and in Mathematical Physics. The collection of apparatus for the illustration of lectures is exten-

sive, and has been secured largely from foreign makers, including sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in more detail are these:

1. **General Physics.** This course is intended to give a general presentation of the facts and laws of Physics. No knowledge of mathematics is assumed beyond an acquaintance with Algebra and Plane Trigonometry. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of Physics and their explanation.

   Required of Sophomores in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

1a. **Elective in Laboratory Work.** This course is open to those who have taken 1, and consists of individual work by the students themselves in the laboratory. The experiments performed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

   Elective for Juniors and Seniors in the A. B., Ph. B. and B. S. courses. Two periods of two hours each weekly throughout the year.

2. **General Physics for Engineers.** This course treats the subject more mathematically than 1, and is given to students in the Engineering course. The Calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of Physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of Sophomores in the B. E. course. Two, three and three classroom hours a week throughout the first, second and third terms, respectively; and one laboratory period a week throughout the year.

2a. **Elective in Mathematical Physics.** This course is open to those who have taken 2, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of Calculus is required, and an elementary knowledge of Differential Equations. Some time is devoted to a further study of Differential Equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for Juniors and Seniors who have taken 2. Two hours a week throughout the year.

3. **Astronomy.** A short course in Astronomy is also given. This course is general and descriptive in character, including some reference to the more elementary mechanical aspects of the subject.

Required of Juniors in the A. B. and B. S. courses, and open as an elective to the Juniors in the Ph. B. course. Three hours a week throughout the second term.

4. **Spherical Trigonometry and Astronomy.** This course differs from the preceding in that it begins with the study of Spherical Trigonometry as applied to some of the problems of practical Astronomy. The course is less descriptive and more mathematical than 3.

Required of Juniors in the General Engineering course, Option A, and in the Sanitary Engineering course. Three hours a week throughout the third term.

5. **Honors.** Candidates for Special Honors must have taken the elective in Mathematical Physics (2a) and are required

to complete a special course of assigned work and reading, extending throughout the Senior year, and to submit theses.

Chemistry

PROFESSOR ELLERY AND INSTRUCTOR EASTMAN

The object of the instruction in this department is to develop power of accurate observation, of logical reasoning, and of forming correct judgments on observed facts. Students who are planning special courses in Chemistry, Medicine, Biology, Geology, or other branches of natural science, will find the courses of great value.

1. **General Chemistry.** The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of Chemistry, a special study of the common metals, and an introduction to Organic Chemistry. The work is distributed through the year as follows:

Fall term: Theories and general principles; study of the occurrence, preparation and properties of the non-metals.

Two lectures and one laboratory period each week.

Winter term: Study of the occurrence, metallurgy and properties of the common metals, and reactions for the metals in solution.

Two lectures and one laboratory period each week.

Spring term: Study of reactions of acid radicals in solution. Elementary blowpipe analysis.

One lecture and four laboratory periods each week.

Required of Sophomores in the B. E. course.

1a. **General Chemistry.** This course is similar to course 1. in that it includes the study of metals and non-metals, theories and principles, but no analytical work is done.

Required of Freshmen in the B. S. course, and of Sophomores in the Ph. B. course. Elective for Juniors and Seniors in the A. B. course. Two lectures and one laboratory period a week throughout the year.

2. **Qualitative Analysis.** This course comprises a systematic examination of metals and acid radicals in solution, and a systematic examination of complex solids.

Required of Juniors in the B. E. course. Three laboratory periods a week during the fall term.

2a. **Qualitative Analysis.** A study of the reactions of bases and acids in solution, a complete course in blowpipe analysis, a systematic examination of solutions of metals and acids, and of complex solids. The aim of the year's work is to enable the student to make a complete qualitative analysis of complex inorganic substances.

Required of Sophomores in the B. S. course, elective for Juniors and Seniors in the Ph. B. course, and for Seniors in the A. B. course who have had course 1a. Three laboratory periods a week throughout the year.

3. **Quantitative Analysis.** This is a course in which the student becomes familiar with the various gravimetric and volumetric methods of analysis.

Elective for Juniors in the B. S. course, and for Seniors in the Ph. B. course, who have had course 2a. Three hours a week throughout the year.

4. **Organic Chemistry.** This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry.

Elective for Seniors in the B. S. course, who have had course 3. Three hours a week throughout the year.

5. **Special Analyses.** This course includes Quantitative Analysis, both gravimetric and volumetric determinations

of common elements, a thorough course in Water Analysis, comprising a study of proper sanitary conditions, as well as complete chemical analysis of various samples of water, collected by the student, and a short course in milk analysis.

Required of Seniors in the Sanitary Engineering course. Two hours a week during the fall and winter terms.

6. **Honors.** Students who have completed course 3 and whose grades in all the work of the department meet the requirements, are eligible to honors in the subject of Chemistry. Such students are required to do some special analytical work and to submit a thesis on the results of their investigations.

Biology and Geology

PROFESSOR STOLLER

1. **General Biology.** This course is intended to give the student a knowledge of living plants and animals, to afford mental training in the study of nature, and to give the student a grasp of the broader facts and principles of biological science in their general philosophical values. Recitations and laboratory work.

Required of Sophomores in the B. S. course, three hours weekly throughout the year, and of Juniors in the Ph. B. course during the first two terms.

2. **Animal Morphology.** This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for teaching or for the medical profession. The work is mainly in the line of comparative anatomy, and includes the dissection of several vertebrate types in detail. Some time is given to elementary histology and embryology, involving the tech-

nique of section-cutting, etc. The course includes the reading of texts in general zoology and embryology.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours (six hours of laboratory work) weekly throughout the year.

3. **Bacteriology.** Students who have elected course 2 may be permitted to take, in the third term, elementary practical bacteriology as an extra or in place of a part of the anatomical work.

4. **General Principles of Zoology.** The aim of this course is to use the data of zoology for their worth as contributing to liberal culture. The more general facts and principles of animal structure, function and development are reviewed and considered in their relation to the study of man. The scientific evidences of organic evolution and the theories of evolution of various authors are considered. Lectures.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

5. **Sanitary Biology.** In this course those organisms especially bacteria, which bear a causal relation to disease and the recent applications in sanitary science of our knowledge of the nature of these organisms, are considered. Some laboratory work in bacteriology is done.

Required of general and sanitary engineers in the Senior Class. Two hours weekly during the second term.

6. **General Geology.** The instruction in this course is adapted primarily to the study of the science as a branch of liberal culture, but enough practical work is included to afford a foundation for special study or for teaching. The work includes laboratory study in determining the

common minerals and rocks, and some field work in structural and historical geology.

Required of Juniors in the A. B. and B. S. courses; elective in the Ph. B. course. Three hours weekly in the first term.

7. **Field Geology.** This course is supplementary to the preceding. The geological formations readily accessible from Schenectady are inspected, fossils are collected and readings from the State geological reports and other literature of the science are made.

Required of Ph. B. students who elect the preceding course. It may be taken as an extra, by permission of the faculty, by A. B. and B. S. students who have taken the preceding course. Three hours weekly during third term.

8. **Economic Geology.** In this course, after a brief study of the principles of dynamic and structural geology, the work is related to the occurrence and distribution in the United States of building stones, mineral ores, coal and other economic products. Recitations, lectures and some laboratory work. Required of Seniors in the B. E. courses. Two hours weekly during the first term.

9. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Physiology and Physical Training

DR. MCCOMBER

Human Anatomy, Physiology, Hygiene and Physical Training are required in all courses. In the Freshman year the work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course cov-

ering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

During the fall term of the Sophomore year a course in Hygiene is given designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on "First Aid to the Injured," "Bacteriology," "Contagious and Infectious Diseases" and "Social Purity" form a part of the course.

It is the aim of the department to give the student such a training in the methods of Physical Education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of Freshmen only, but the organization of voluntary classes makes it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics at the end of the Winter term, credit being based upon actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygienic data are furnished upon payment of a small

fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical language and literature of the late Professor Tayler Lewis. The income from a bequest of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the "Thomson Alcove," is reserved for these books. By the will of the late Rev. Oscar Blakeslee Hitchcock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the College for the purchase of books, manuscripts, etc. A most important accession lately acquired is the "Croes Engineering Library," the gift of Mr. Edgar Beach Van Winkle of the class of 1860. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules

Hours 8-1; 2-6; 7-9 from Monday to Friday. 8-1; 7-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of $1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

Dr. D. S. Martin, Honorary Curator of the Wheatley Collection of Minerals.

The collections have recently been transferred to the third floor of Nott Memorial Hall. The opportunity is being used for the re-inspection of all the material and for placing the collections in order with reference to their preservation and their educational use.

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the

entire collection has been re-arranged and placed in order for exhibition and for study. It has also been enriched by additional specimens, some of them from the personal collection of Dr. Martin, now presented to the college, and others from the Brooks collection, a gift to the college from Mr. Alfred H. Brooks of the United States Geological Survey, in memory of his father, a graduate of the college, by whom the colleection was made.

In Geology there is a general collection of rocks and minerals, and a considerable collection of Paleozoic and Mesozoic fossils. The collections made by the geological department under the direction of Professor C. S. Prosser so increased the museum that there is plenty of material now available, especially for the careful study of the Paleozoic rocks and fossils of the New York formations. These have recently been examined, re-arranged and placed in cases for exhibition by Dr. Martin.

In Zoology, the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the Eastern United States. These have recently been carefully inspected, and re-labelled. A considerable number of specimens of Porto Rican birds, collected and presented to the college by Mr. Byron W. Reed of the class of 1906, and mounted by Mr. John R. Nowell of the class of 1905 have been added. Of mammals there is a collection of 57 skins, the gift of the U. S. National Museum, and a number of skulls, skeletons and mounted specimens. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms, crustacea and mollusks, the total number of species represented being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady County. The flora of the United States is

further represented by collections from Virginia, the Red River region of the Southwest, and those made by Dr. Nevins in Alabama. The lower cryptogams are represented by a valuable collection of 2,300 specimens of fungi, the gift of Mr. J. B. Ellis, of the class of 1851. The Herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence, that of Engler and Prantl's Natürliche Pflanzenfamilien, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

CURRICULUM OF THE A. B. COURSE[1]

	First Term	Second Term	Third Term
Freshman Year	4 Greek 4 Latin 3 French, or[2] German 2 Rhetoric 4 Solid Geometry 1 Physiology Greek Prose Composition Latin Prose Composition	4 Greek 4 Latin 3 French, or[2] German 2 Rhetoric 4 Algebra 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics	4 Greek 4 Latin 3 French, or[2] German 2 Rhetoric 3 Trigonometry 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics
Sophomore Year	3 Greek 3 Latin 3 German, or[2] French 2 English and Rhetoric 2 History or Mathematics 3 Physics 1 Hygiene	3 Greek 3 Latin 3 German, or[2] French 3 English and Rhetoric 2 History or Mathematics 3 Physics	3 Greek 3 Latin 3 German, or[2] French 3 English and Rhetoric 2 History or Mathematics 3 Physics
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective[3]	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective[3]	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective[3]
Senior Year	1 Rhetoric 3 Economics 13 Elective[3]	1 Rhetoric 3 Sociology 13 Elective[3]	1 Rhetoric 3 Sociology 13 Elective[3]

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]Those entering Course A—see page 37, take French during Freshmen Year and German during Sophomore Year. Those entering Course B—see page 37, take two years of that modern language not offered for admission.

[3]For list of electives, see pages 80–82.

CURRICULUM OF THE PH. B. COURSE[1]

	First Term	Second Term	Third Term
Freshman Year	4 Latin 3 German 3 French 2 Rhetoric 4 Solid Geometry 1 Physiology Latin Prose Composition	4 Latin 3 German 3 French 2 Rhetoric 4 Algebra 1 Physiology Latin Prose Composition 1 Gymnastics	4 Latin 3 German 3 French 2 Rhetoric 3 Trigonometry 1 Physiology 1 Gymnastics
Sophomore Year	3 Latin 3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 1 Hygiene	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry
Junior Year	3 English and Rhetoric 3 Logic 3 Biology 7 Elective[2]	3 English and Rhetoric 3 Psychology 3 Biology 7 Elective[2]	3 English and Rhetoric 3 Ethics 3 Biology 7 Elective[2]
Senior Year	1 Rhetoric 3 Economics 13 Elective[2]	1 Rhetoric 3 Sociology 13 Elective[2]	1 Rhetoric 3 Sociology 13 Elective[2]

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]For list of electives, see pages 80–82.

CURRICULUM OF THE B. S. COURSE[1]

	First Term	Second Term	Third Term
Freshman Year	3 French 3 German 2 Rhetoric 4 Algebra 3 Chemistry 1 Physiology	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics
Sophomore Year	3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology 1 Hygiene	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective[2]	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective[2]	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective[2]
Senior Year	1 Rhetoric 3 Economics 13 Elective[2]	1 Rhetoric 3 Sociology 13 Elective[2]	1 Rhetoric 3 Sociology 13 Elective[2]

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]For list of electives see pages 80–82.

LIST OF ELECTIVES FOR ALL COURSES

[For limiting conditions, see statements of respective departments]

Junior Groups

A total of seven hours is required.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

GROUP I

A. American History (3 hours) M., W., F., 8–9.

B. Solid Analytic Geometry, Differential Calculus[1] [2] (2 hours) W. F., 8–9.

GROUP II

A. Latin[1] [2] (2 hours) M., W., 9–10.

GROUP III

A. Argumentation (2 hours) Th., S., 9–10.

B. Shakespeare (1 hour) S., 9–10.

GROUP IV

A. French (3 hours) M., W., F., 10–11.

B. Anglo Saxon (2 hours) W., F., 10–11.

GROUP V

A. Spanish (3 hours) M., W., F., 3:30–4:30.

B. (a) Mathematical Physics (2 hours) M., W., 3:30–4:30.
(b) Field Geology[4] (3 hours) F., 1:30–4:30.
(c) Physical Laboratory (2 hours) M., W., 1:30–3:30.

C. (a) Mathematical Physics (2 hours) M., W., 3:30–4:30.
(b) General Chemistry[1] (3 hours) T., Th., 11–12; F., 1:30–4:30.
(c) Physical Laboratory (2 hours) M., W., 1:30–3:30.

GROUP VI

A. Qualitative Analysis[2] (3 hours) T., Th., 1:30–4:30.
B. Quantitative Analysis[3] (3 hours) T., Th., 1:30–4:30.
C. (a) Greek[1] (2 hours) T., Th., 1:30–2:30.
(b) Medieval History (2 hours) T., Th., 2:30–3:30.

GROUP VII

A. Integral Calculus[3] (2 hours) T., Th., 11–12.

GROUP VIII

A. German (3 hours) T., Th., S., 10–11.

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[1]For A. B. Course
[2]For Ph. B. Course
[3]For B. S. Course
[4]See statement of course

Senior Groups

A total of thirteen hours is required.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

GROUP I

A. Morphology (3 hours) M., W., F., 9–11.
B. (a) European History (3 hours) M., W., F., 9–10.
(b) German (2 hours) M., F., 10–11.
(c) Greek[1] (2 hours) M., 11–12; W., 10–11.
C. (a) Differential Equations (2 hours) W., F., 9–10.
(b) German (2 hours) M., F., 10–11.
(c) Greek[1] (2 hours) M., 11–12; W., 10–11.

GROUP II

A. General Geology (3 hours) T. Th., 10–11; S., 9–10.
B. (a) Latin[1 2] (2 hours) T., Th., 10–11.
(b) Shakespeare (1 hour) S., 9–10.

GROUP III

A. History of Philosophy (3 hours) T., Th., S., 11–12.
B. General Chemistry[1] (3 hours) T., Th., 11–12; F., 1:30–4:30.
C. Integral Calculus[1] [2] (2 hours) T., Th., 11–12.

GROUP IV

A. Spanish[4] (3 hours) M., W., F., 3:30–4:30.
B. (a) Mathematical Physics (2 hours) M., W., 3:30–4:30.
(b) General Chemistry[1] (3 hours) T., Th., 11–12; F., 1:30–4:30.

GROUP V

A. Physical Laboratory (2 hours) M., W., 1:30–3:30.
B. Spanish (2 hours) M., W., 2:30–3:30.
C. Advanced Argumentation (2 hours) W., 1:30–3:30.

GROUP VI

A. Qualitative Analysis[1] [2] (3 hours) T., Th., 1:30–4:30.
B. Quantitative Analysis[2] [3] (3 hours) T., Th., 1:30–4:30.
C. Organic Chemistry[3] (3 hours) T., Th., 1:30–4:30.
D. (a) English Poetry (2 hours) T., Th., 1:30–2:30.
(b) French (2 hours) T., Th., 2:30–3:30.
(c) Medieval History (2 hours) T., Th., 3:30–4:30.

GROUP VII

A. Advanced Psychology, Advanced Ethics and Evolution of Religion (3 hours) M., W., F., 8–9.

GROUP VIII

A. Comparative Politics and International Law (2 hours) T., Th., 9–10.

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[1]For A. B. Course
[2]For Ph. B. Course
[3]For B. S. Course
[4]For those who have not had Spanish in Junior year

UNION COLLEGE

SCHOOL OF ENGINEERING

FACULTY

GEORGE ALEXANDER, D. D.
President ad interim

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean and Professor of History and Sociology

SIDNEY G. ASHMORE, A. M., L. H. D.
Professor of the Latin Language and Literature

FRANK S. HOFFMAN, A. M., PH. D.
Professor of Mental and Moral Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK COE BARNES, A. B., PH. D.
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

JOHN W. HUGHES, B. S. in C. E.
Assistant Professor of Civil Engineering

OLIN J. FERGUSON, B. S. in E. E.
Assistant Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

ERNST JULIUS BERG
Consulting Professor in Electrical Engineering

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

DANIEL A. YOUNG, B. S. in C. E.
Instructor in Civil Engineering

JAMES H. CUNNINGHAM, B. E.
Instructor in Electrical Engineering

MORLAND KING, B. E., M. E. E.
Instructor in Electrical Engineering

OSCAR VON VOIGTLANDER, M. E.
Instructor in Civil Engineering

FRANK W. SMITH
Instructor in Modern Languages

ALBERT S. EASTMAN, B. S.
Instructor in Chemistry

HORATIO M. POLLOCK, PH. D.
Instructor in History and Sociology

JOHN A. C. CALLAN, B. S. in C. E.
Instructor in Engineering Drawing

M. F. WESTOVER
Lecturer on Organization and Management of Corporations

J. L. R. HAYDEN
Lecturer on Arc Lighting and Photometry and
Supervisor of Electr. Eng. Thesis work

THE ENGINEERING SCHOOL

Introductory. The charter of Union University brings together under one corporate name and administration Union College, located at Schenectady, N. Y., and the Law School, the Medical College, the Dudley Observatory and the College of Pharmacy, all located at Albany, N. Y.

The Engineering School forms a part of Union College. Its connection with the regular college courses and with the other members of the university group is considered an advantage, as it furnishes opportunities for general culture not usually available in a purely technical school.

Historical. When Union College was chartered, in February, 1795, the only American colleges west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of L'Ecole des Ponts et Chaussées, of Paris, France, where Prof. Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at

its foundation it has never departed, although it has endeavored to keep pace with the development in American technical education and with the increased demands on professional training. For many years Civil Engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies were discerned, a course in Sanitary Engineering, was established; and more recently a course in Electrical Engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River, and is intersected by several steam railroads, a number of interurban electric trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features may be mentioned the city grade-crossings improvement recently completed at a cost of a million dollars, and the city waterworks, which contain in their outfit a system of ground-water wells and a recently installed set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offer numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the Scientific Departments of the State Government at Albany, including the headquarters of the State En-

gineer's Department including also the new Barge Canal, and the Good Roads Division; the headquarters of the State Water Supply Commission which includes also the State River Improvement work; the State Library; the Albany City Water Filtration Plant; at Troy the Burden Iron Works; the Gurley Engineering Instrument Manufactory; at Watervliet the United States Arsenal and Gun Factory; the Water Power Developments and Electric Power Transmission Plants at Mechanicville, Spier Falls and Johnsonville; the Hydraulic Cement Works at Glens Falls and at Howe's Cave; and the Modern Sewage Disposal Systems at Saratoga Springs and at Ballston Spa. The new barge canal will pass the Cohoes Falls by a flight of locks and will pass Schenectady by a system of locks and dams which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies, to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Alternate Courses of Study. Four undergraduate courses of study in engineering are offered, three extending through four years and one extending through six years:—(1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last two years, while the electrical course in its last two years differs widely from the other courses. The degree of Bachelor of Engineering (B. E.) is given for the successful completion of any one of the above three courses.

A six-year course in general engineering is also offered comprising the above four-year course in general engineering, course (1), and the regular four-year Latin-scientific course of the Academic Department, with the subjects of the two courses properly interwoven during each term. The course thus offers a combined college and technical training with the subjects of the two properly correlated. The degrees of Bachelor of Engineering (B. E.) and of Bachelor if Philosophy (Ph. B.) are given on the satisfactory completion of this course.

Graduate Courses. In addition to the above undergraduate courses in engineering, two graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M.C. E.) and of Master of Electrical Engineering (M. E. E.) are given on the satisfactory completion of one-year graduate courses of study in Civil Engineering and in Electrical Engineering, respectively.

REQUIREMENTS FOR ADMISSION TO THE ENGINEERING SCHOOL

Common to all Engineering Courses

General Conditions for Admission. The general conditions governing admission to the Engineering School are stated in detail on page 36.

Requirements for Examination. Candidates for admission to the Freshman class in any of the engineering courses are required to pass satisfactory examinations in, or present approved certificates covering, the following subjects:

English Literature, Arithmetic, Algebra, Plane and Solid Geometry, Plane Trigonometry, Physics, German or French, History of the United States, Modern Geography, and Physiology, as given in detail on pages 38-43.

Candidates for admission to the Freshman class of the six-year undergraduate course are required, in addition, to pass a satisfactory examination or present approved certificates in Latin (3) page 40.

EXPENSES, TERMS AND VACATIONS

For information regarding expenses, terms and vacations, see pages 138-139 and page 24.

STUDIES OF THE FOUR COURSES

Outline Description. The following is an outline of those studies which in general are common to the three four-year courses in General, Sanitary, and Electrical Engineering and to the six-year General Engineering and Latin-Scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of General Studies and Technical Studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and laboratory work. Physical laboratory work is required of all engineering students. See also pages 64-67.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the Freshman and Sophomore years and laboratory work in qualitative analysis is continued through the first term of the Junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during the first and second terms of the Senior year. See also pages 67-69.

Astronomy. The instruction in astronomy includes physical astronomy, spherical astronomy and the theory of astronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science. See also pages 69-71.

Geology (not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States. See also pages 69-71.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the Freshman year. In the first term a summary review of diction is given. In the second and third terms more attention is given to the development of thought by work upon kinds of composition and the paragraph. In the Sophomore year English Literature as represented by the work of the essayists and by Shakespeare is studied. In the Senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of Civil Engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects. See also pages 54-58.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the alternate language not offered. Some work in scientific French and scientific German is done during the latter part of the course. See also pages 49-54.

History and Economics. American history throughout the Junior year and economics during the first term of the Senior year are required of all engineering students.

Sociology, Political Science and International Law. General engineering students who elect "Option B" in engineer-

ing administration are required to have sociology during the last two terms of the Junior year, political science during the first two terms of the Senior year, and international law during the last term of the Senior year.

Physiology and Physical Training. See pages 71-73.

Studies of the Six-year Engineering and Latin-Scientific Course. For the studies of this course not described above, see the curriculum on pages 128-131 and the detailed descriptions as follows:—

For Latin, see page 47.
For English Literature, see page 54.
For Rhetoric, see page 56.
For History and Sociology, see page 58.
For Logic and Psychology, see page 60.
For Biology and Geology, see page 69.

Voluntary Studies. Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the Faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the General Engineering Department.

Mathematics. To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

The following courses are required:

Algebra, advanced, including elements of determinants. Required of Freshmen. Four hours weekly during first term.

Plane Trigonometry. Required of Freshmen in addition to the trigonometry required at entrance. One hour weekly during third term.

Spherical Trigonometry. Required of Juniors in the General Engineering Course "Option A," and in the Sanitary Engineering Course. Three hours per week during a part of the third term.

Analytic Geometry. Required of Freshmen. Four hours weekly during second term, and two hours weekly during third term.

Calculus. Differential and Integral Calculus. Three hours weekly during third term of Freshman year, three hours weekly during first and second terms, and two hours weekly during third term of Sophomore year.

Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics and pneumatics. These studies form the foundation for the technical studies of applied mechanics, strength of materials and stresses in framed structures, all of which are fundamental to one of the chief divisions of an engineer's duties, namely, that of designing. Required of Sophomores. Three hours first term, two hours second term and one hour third term.

Drawing and Descriptive Geometry. The instruction in this work extends through the entire course. In the first term of the Freshman year the student is instructed in freehand drawing and in freehand lettering. In the second term he is instructed in the use of drawing instruments, in orthographic projections and in construction of geometrical problems and instrumental lettering. In the third term Freshman and first term Sophomore he is given practice in plotting surveys made in the field. Further instruction in topographical

drawing follows in the first term of the Sophomore year. Descriptive geometry is begun in the second term Sophomore and, in addition to instruction in the theory, some of the most common applications in practice are taught by the use of practical problems. Schroeder's models and the Olivier models, as well as the models of intersections of the Paris Polytechnic School, are freely used. In the third term Sophomore instruction is given in shades, shadows and perspective and in the theories of oblique projections.

Mensuration and Surveying. This work is begun in the second term of the Freshman year by the study of pure and applied mensuration, together with the fundamental principles of error, precision and computations, illustrated by practice. In the third term the theory of surveying instruments and operations is taken up and illustrated by field practice with the chain, tape, compass, transit, level and rod. In the first term Sophomores topographical surveying is commenced and instruction and practice are given in the use of the various methods and instruments.

As a preliminary to instruction in each branch of surveying a thorough study of the instruments employed is made, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. The classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field surveys.

Applied Mechanics and Materials. Applied mechanics is commenced in the first term of the Junior year, and comprises the extension of analytical mechanics and the development of the methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

In conjunction with this work is given the study of the production, preparation, strength and physical properties of the

various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel. Practice in the engineering laboratory is an important adjunct to this study.

This entire division, properly correlated, becomes the foundation of all rational engineering design and construction.

Engineering Law and Procedure. During the first and second terms of the Freshman year and the third term of the Senior year a series of lectures is given on topics pertaining to the training and the qualifications of engineers, and to engineering practice. In the Junior and Senior years in "Option B," and in the third term of the Senior year of "Option A," a course is given in the study of the elements of the law and principles of procedure in contracts, agency, corporations, commercial and financial transactions and industrial accounting and of the law relating to land boundaries and titles, water courses and surveys.

Final Examinations. During the Senior year a series of final examinations will be held covering the more important subjects of the entire course. The list of subjects in which examinations are to be given during any term will be determined by the faculty.

Theses. Each candidate for graduation is required to present on or before the last Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of Civil Engineering or of Electrical Engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Reviews or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of

the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted for approval not later than November preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress.

Library

The College Library contains the Engineering and Scientific Library of the late Professor Gillespie and other valuable technical collections. See page 73.

GENERAL ENGINEERING DEPARTMENT

Two Alternate Courses. In the four-year general engineering course two alternate courses or options are offered, either of which may be selected by general engineering students at the beginning of the Junior year, and each of which extends through the Junior and Senior years. The first of these alternate courses, designated as "Option A," offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession. The other alternate course, designated as "Option B," while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this alternate course is to offer to engineering students an opportunity better to qualify themselves for engineering positions of an executive or adminis-

trative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found later on pages 123, 124, 130, 131.

In addition to the studies common to all engineering courses previously described on pages 91-98, the following subjects are included in the general engineering course. Unless otherwise stated, the following studies are required in each of the two alternate courses in General Engineering:

Drawing and Descriptive Geometry (continued). In the Junior year work in drawing includes machine drawing and the solution of problems in graphical analysis. In the Senior year the subject includes the work in engineering design and construction of the last two terms, and comprises a large amount of structural drawing in the development of the designs of engineering structures. A course in stereotomy and stone cutting is given in the first term Senior, with drawings from the stereotomy models of the Paris Polytechnic School. Practice in blue printing is made a part of these courses.

Surveying (continued). Railroad surveying is treated in the third term of the Junior year, and the students are given exercises in the proper field operations on railroad surveys, office and field location and staking out work for construction. The subject of railroad construction and equipment is not treated until the first term of the Senior year.

Field and Laboratory Practice. In addition to the weekly field and laboratory exercises throughout the year, all Freshman, Sophomore and General Junior engineering students will be given an uninterrupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course will begin on the day (Thursday) following Commencement and will continue through that and the two following weeks. The work will be so selected and arranged as not only to supplement

the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. The practice will form a part of the spring term work.

Astronomy. A short course in Descriptive and Mathematical Astronomy, occupying, with some preliminary work in Spherical Trigonometry, three hours during the spring term of the Junior year.

Least Squares, Geodesy and Field Astronomy. This course is given three hours weekly, during the second and third terms of the Senior year. After a study of the fundamental principles of the adjustment of errors and their use in finding the weights and probable errors and in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up, accompanied by field work which also includes the determination of time, latitude, and azimuth, with ordinary instruments and with methods and instruments of an observatory.

Engineering Design. The course in applied mechanics and materials prepares the student to undertake the study of engineering design proper, which is pursued throughout the Senior year; an important feature of this course is the work in bridges, railroads and water-power developments, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and conditions, the preliminary study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class.

Water. The subject of water is considered from several standpoints. In the first term Junior is given a laboratory course in chemistry, followed by a course in water analysis. In the third term Junior is given a course in hydraulics, followed in the Senior year by a fuller development of the subject as applied to rainfall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines.

Highways. The study of highways in the first term of the Junior year comprises a consideration of the highway as an element in the transportation system of the State, the principles of its economic location and proper construction, a study of the various modes of construction and the materials employed, its proper maintenance and systems of highway laws and administration.

As a preliminary to the study of highway location as well as of railroad and route surveying, some consideration is given to the principles and fundamental laws of topographical types and forms and their relation to the various modes of earth sculpture.

Streets and Pavements. A study of the methods of laying out and grading streets and pavements and of the various street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects, is also given during the first term of the Junior year.

Motors and Motive Power. Following the work in thermodynamics and hydraulics of the third term of the Junior year an outline course in motors and motive power is given in the first and second terms of the Senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines,

gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity.

Electrical Machinery and Transmission. Following the instruction in electricity in the Department of Physics, General Engineering students are given, during the second term of the Junior year, a three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments.

Principles of Finance, Business, Accounting. General engineering students who elect "Option B" are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping during the second and third terms of the Senior year.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, prismatic compasses, Burnier's compass, solar compass, Y levels, the levels of Troughton, Egault, Lenoir and Burnier; plane tables, sextant, octant, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the Engineering School.

The collection of models in Descriptive Geometry and Stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models, representing the most important and complicated ruled surfaces of Descriptive Geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the gener-

atrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while Professor of Descriptive Geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory of Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading *"Inventé par Theodore Olivier,"* etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own words being, *"Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité."*

Professor Bardin's (Paris) plaster models (seventy) of the INTERSECTIONS of prisms, pyramids, cylinders, cones, etc.

Schroeder's (Darmstadt) models (twenty) of elementary DESCRIPTIVE GEOMETRY. The planes of projection are in wood, and the lines and surfaces in metal; models illustrating Shades and Shadows.

Stone Cutting Models (twenty) in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of OBLIQUE ARCHES.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique light; models and maps in colored topography; a large model of Mount Cenis Pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of Architecture from L'École des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbro.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doyne's Dynamometer Bridge Models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and

architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in Physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are, without exception, open at all times to the students. They furnish an admirable means of practical illustration in Mineralogy. Among the rare and valuable specimens are those of Anglesite, Cerusite, Mimetite and Calcuprite, which in American specimens are equaled only by those in the British Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The College possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been arranged to illustrate their mode of occurrence and geographical distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.; also suites of specimens of wood, charcoal, mineral coal, peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus

necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and of some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collections of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of municipal public works and of systems of water supply, sewerage and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering differs from the general engineering course by

omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical laboratory work.

Sanitary Conditions of Buildings. In the first and third term Senior, respectively, are given courses in heating and ventilation and in house drainage and plumbing. The latter course will give special attention to the matter of water supply and of the removal of wastes from buildings in all situations, from the isolated country house to that in a thoroughly drained city.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the Senior year. The fundamental sanitary and constructive principles will be developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. A course of lectures in the third term Senior presents the principles upon which the laws touching the subject of the public health are based and the outlying principles which should govern the preparation of sanitary codes and regulations.

Graduate Course
in
General or Sanitary Engineering

Leading to the Degree of M. C. E.

This course of one year's graduate study, consisting of lectures, laboratory and research work is open to graduates of the General or the Sanitary Engineering Course of Union College or of any other institution of a standing recognized by the Faculty.

Correspondence regarding admission to the undergraduate

courses should be addressed to the Secretary of the Faculty. Correspondence regarding admission to the graduate course in Civil Engineering may be addressed to

OLIN H. LANDRETH
Professor of Engineering
Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in Electrical Engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company.

The course of studies offered by the Department of Electrical Engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefore, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in Electrical Engineering, which, while it enables the student, after graduation, to enter the field of Electrical Engineering practice in the manufacturing or operating company or consulting engineer's office in a subordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts—that is, aims at quality, and not quantity—and as far as possible in all engineering instruction the sub-

ject is brought before the students in three different ways; by a theoretical lecture course with recitations, practical instruction in the electrical laboratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design in the drafting room. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating thesis. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the College authorities and the officials of the company by which the students in the Junior and Senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the Junior year, however, the courses diverge. The electrical engineers take up a number of mechanical en-

gineering subjects and continue them throughout the Junior and first part of the Senior year. In fact, during the Junior year the mechanical engineering work may be considered as constituting the major subject, though a considerable amount of time is also devoted to electrical engineering.

Studies also required in other courses are:

3. **American History,** see page 58.
3. **Rhetoric,** see page 56.
2. **Analytic Chemistry,** see page 67.
   Natural Perspective
6. **Economics,** see page 59.
   Engineering Law and Prccedure, see page 97.

The mechanical engineering subjects not previously described are:

M.E.1. Hydraulics and Hydraulic Machinery. First term, Mr. CUNNINGHAM.

M.E.1. Hydraulic Turbine Design. Second term, Mr. CUNNINGHAM.

M.E.2. Theory of the Steam Engine. Second term, Mr. KING.

M.E.2. Steam Engine Design. Third term, Mr. KING.

M.E.3. Thermodynamics, Gas Engine and Steam Turbine. First term, Asst. Prof. FERGUSON.

Other general subjects given only to electrical engineering students are:

C.E.1. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession. Third term.

Seminar. Beginning with the Junior year one hour per week is given in mathematical seminar. Practical engineering prob-

lems are proposed, in the solution of which it is necessary to utilize the field of mathematics previously covered. Mechanics, thermodynamics, hydraulics, electrical phenomena of permanent or transient form—all combine to make an inexhaustible field from which graded problems are selected. This is the practical application of Algebra, Trigonometry, Calculus, etc.

The Senior year continues these exercises with problems constantly increasing in difficulty. Asst. Prof. FERGUSON.

The electrical engineering studies include the following:

E.E.1. Engineering Mathematics. One lecture a week is given throughout the Junior year on the special branches of mathematics most employed in engineering work. It is recognized that mathematics is the foundation of all engineering, and a considerable part of the Freshman and Sophomore years is therefore devoted to the study of mathematics. In addition thereto this course is given specially to train the students in those particular branches of mathematics which are most frequently applied in electrical engineering, and so enable them to handle mathematics as a ready working tool in practical engineering problems. This course covers complex quantities; the infinite series, its derivation and meaning; the trigonometric series; determination of maxima and minima; the fundamental differential equation of electrical engineering and its integral; empirical curves and their investigation, as the parabolic, exponential and logarithmic function. First, second and third terms, Dr. STEINMETZ, Mr. CUNNINGHAM.

E.E.2. Direct Current Circuits and Apparatus. Students in electrical engineering devote a considerable part of the Junior year to the study of the fundamental principles of the subject. Direct current phenomena are studied first, as this part of the subject is somewhat simpler and is readily brought within the grasp of the average student. This work includes the theory and practice of direct current generators and motors and auxiliary apparatus, taking into account also the principles of design. First and second terms, Mr. KING.

Alternating Current Circuits and Apparatus

E.E.3. *Junior.* Fundamentals of alternating current circuits and machines. Many problems are assigned in order to make the work specific and concrete. Second and third terms, Mr. CUNNINGHAM.

E.E.4. *Senior.* A continuation of E.E.3, becoming more advanced. Analyses and discussions of generators, synchronous motors, transformers, induction motors, series motors, convertors, higher harmonies, etc. First and second terms, Asst. Prof. FERGUSON.

E.E.5. Direct Current Laboratory. The work under this head is parallel with E.E.2, and includes all standard tests of direct current machines, and is supplemented by numerous experiments arranged with due regard to their general importance and scientific value. The machines with which the student has become more or less familiar in class work are here examined in detail and careful records made of efficiency, regulation, internal characteristics, commutation under varying loads, etc. First and second terms, Mr. CUNNINGHAM.

E.E.6. Alternating Current Laboratory. The work done here in the Junior year consists of an extensive series of experiments corroborating and explaining the theories of the lecture room. The exercises consist in investigation of voltage and current conditions on a variety of combinations of resistance, inductance and capacity in series and in multiple, the exploring of field flux and wave shapes of alternators, and the effect of inductance and capacity on wave shape, the use and calibration of meters, the potentiometer, the photometer, etc. Upon entering the Senior year the student is thus equipped with the broad foundation in the underlying principles of electrical engineering, which is absolutely essential to a comprehensive study of the more intricate and special departments of the subject. Third term, Mr. CUNNINGHAM.

E.E.7. Alternating Current Laboratory. In this course, complete tests are made on the apparatus studied, and the

characteristics of the various machines are determined. The laboratory work deals with the transformer: ratio, impedance and coreloss characteristic, regulation and heat runs, the synchronous motor and generator: amplitude and phase displacement of the various phases of multiphase machines, no load and load saturation, phase characteristics, pulsation, regulation and compounding curves, starting test, etc., the induction motor: determination and plotting of curves for power factor, speed, slip, torque, efficiency as function of speed, starting tests on motors with squirrel cage armatures and compensator, also on machines with variable rotor resistance, impedance and coreloss curves and maximum output determination, the single phase induction motor, the use of the oscillograph, etc. First and second terms, Mr. CUNNINGHAM.

E.E.8. Design.—Direct Current Machines. When E.E.2 has been finished each student is directed to design a specified machine and is required to do this work in class and without other aid than that given by the instructor. Complete calculations, with curves, where necessary, and working drawings of the machine designed, are required, and credit is given for accuracy, originality and neatness. Third term, Mr. KING.

E.E.9. Alternating Current Machines. This subject is a continuation throughout the Senior year of the Machine Design begun during the Junior year, and the two are handled in much the same manner. Transformers, induction motors, alternating current generators, etc., are calculated and their layouts completed. As each type of machine is taken up, fundamental lectures are first given, outlining the requirements for successful construction and operation and supplying data for all computations. Individual work is then assigned to each student and is carried out under the personal supervision of the instructor. First, second and third terms, Asst. Prof. FERGUSON.

E.E.11. Electric Lighting. Wiring, systems of distribution and their comparative economy and efficiency, standard types of incandescent lamps and arc lamps, recent developments in these lines, vacuum tube lamps, the arc, photometry, illuminating engineering, etc. Third term, Asst. Prof. FERGUSON.

E.E.12. Technical Literature. For the engineer ordinarily to neglect technical literature of the day is to live in the past. In this course, students are required to report in class upon certain English, German, French or American publications assigned to them, reviewing briefly the best articles found in current numbers. There are also included library references to biographical sketches and research works of eminent men.

It is intended by this means that the student shall become broadly familiar with the sources of the best and the most recent technical literature; that he shall learn how to keep abreast of the times; that he shall acquaint himself with channels through which he may obtain information upon any particular subjects; that he shall be able to summarize any article he reads, picking out its salient points; that he shall receive practice in expressing his thoughts clearly and concisely upon important subjects. First, second and third terms, Asst. Prof. FERGUSON.

E.E.13. Electrochemistry. Theory of solutions, osmotic pressure, dissociation, concentrations, electrical processes of manufacture of commercial chemicals, electric furnaces, etc. This subject is daily becoming of greater importance. Second term, Mr. KING.

E.E.14. Electric Transmission. The subjects discussed here are long distance transmission, line construction, systems, grouping of machines, control of phase, methods of compensation, maximum power supplied over line, line efficiency, copper efficiency, distributed capacity, inductance, resistance, leakage and natural period of transmission line, surging, reso-

nance due to higher harmonics, balanced and unbalanced polyphase systems, transformations, lightning, lightning protection. First, second and third terms, Mr. KING.

E.E.15. Electric Railways. The subject of electric railway engineering is treated in three sections: 1. From the point of view of the consulting engineer who, being retained by the promoters of a proposed railway, investigates the field and territory of the new line, advises as to probable earnings of line, lays route, prepares plans and specifications and has charge of construction. 2. From the point of view of the operating engineers who have charge of rolling stock and maintenance of service on the line. This includes a complete discussion of the equipment of modern electric railways, the various systems in vogue, sub-station equipment and in general the operation of electric railways. 3. The problem of the electric railway as it is presented to the designing electrical engineer is discussed. About half of the time devoted to railways is reserved for this section of the work. The questions of predetermination of railway motors from service characteristics, of train resistance and other quantities affecting the operation of electric trains are treated and the various alternating current railway motors which are being developed are discussed. The experimental railroad operated by the General Electric Company in Schenectady is a valuable auxiliary in this course. Second and third terms, Asst. Prof. FERGUSON.

E.E.17. Electrical Engineering Practice. This course of lectures is designed to put the student into touch with the most recent developments of advanced engineering practice. It emphasizes the fact that an engineer must be well equipped and resourceful in order successfully to attack new problems. It is an outgrowth of what was formerly known as a Lecture Course by Specialists. Second and third terms, Mr. BERG.

E.E.18. Electrical Engineering Theory. Beneath the whole superstructure of Electrical Engineering is one broad base. This

foundation is the same for alternating currents, or direct currents; motors or generators; power circuits or telephone circuits; local distribution or long distance transmission, permament phenomena or transient phenomena. These courses of lectures lead to a better conception of relations existing among the seemingly, widely separated branches of the applied science and furnish foundation and incentive for subsequent advanced work. First, second and third terms, Prof. STEINMETZ and Asst. Prof. FERGUSON.

E.E.19. Thesis. (See page 97.) First, second and third terms.

Lectures by Engineers. To Juniors and Seniors of this course is available the notable privilege of becoming, upon the payment of a nominal fee, members of the Schenectady Section of the American Institute of Electrical Engineers. Throughout the winter occur, before this Section, a succession of lectures probably without an equal except before the national body itself. The value of this course cannot be overestimated.

A partial list of the speakers of the past season is added:

T. C. MARTIN
E. G. ACHESON
R. W. RAYMOND
J. B. TAYLOR
PROF. W. S. FRANKLIN.
W. S. ANDREWS
PROF. ELIHU THOMSON
G. H. HILL
C. J. MELLIN
H. H. SUPLEE
PROF. C. P. STEINMETZ
E. J. BERG
W. B. POTTER
C. W. STONE
W. S. MOODY
D. B. RUSHMORE
K. A. PAULY
E. E. F. CREIGHTON
A. G. DAVIS
H. W. DARLING
W. L. R. EMMETT

Electrical Laboratory Equipment

The Electrical Engineering Laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the building is T-shaped. The upper bar of the T has two stories. The lower floor is devoted to three laboratory rooms, the largest of which is 101 ft. by 35 ft. outside dimensions. This is the main laboratory and extends from front to rear of the building.

A light well-ventilated drafting room occupies the major portion of the second floor, being 73 ft. by 27 ft. in dimensions.

The purpose of a college laboratory of Electrical Engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the Electrical Engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the Works and Testing Department of the General Electric Company under the direction of the college instructors, which trips constitute an integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A direct connected unit consisting of a Westinghouse Gas Engine and a direct current generator; a motor-generator set consisting of a 17.5 K.W. direct current generator direct connected to a three-phase 220 volt induction motor; connection with the 550 volt direct current trolley circuit of the Schenectady Railway Company; connection with the three-phase 2300 volt power circuit of the Schenectady Illuminating Company. In the latter case voltage is reduced by banks of step down transformers, so that the students can handle the safe low tension circuits only.

A secondary supply is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

A very large number of various sizes of transformers are provided to give the students practical experience in connecting transformers for different ratios and for transformation between three-phase, quarter-phase, six-phase, etc., systems. The equipment further contains three-phase, quarter-phase and six-phase alternators and synchronous motors, the two characteristic types of induction motors, three and six-phase rotary converters, bipolar and multipolar generators, and numerous smaller induction motors, converters and direct current motors and generators of different types. A constant current arc machine, with different types of arc lamps and a constant alternating current transformer, with series arc lamps, testing tables, switchboards and numerous instruments of the indicating and the integrating type ,are also provided for efficient instruction.

Among the recent additions to the laboratory are an oscillograph and a potentiometer. The former is the standard three galvanometer type, manufactured by the General Electric Company, with photographic and tracing attachments. With this instrument wave forms may be traced or photographically recorded and transient phenomena of the electric circuit studied and investigated. The potentiometer is an absolute standard for the calibration of electrical instruments and is similar to that used by the Public Service Commission of New York State.

Graduate Course

Leading to the Degree of M. E. E.

To those students who, after graduating from the four-year Electrical Engineering course, desire to increase their knowledge a Graduate course of one year is offered in which, besides instruction in higher branches of Electrical Engineering, there will be occasion to carry out original investigations under the supervision and with the assistance of specialists prominent in Electrical Engineering practice on subjects closely connected with the most recent advance of Electrical Engineering. In return for the assistance offered to the Graduate students in their research work by prominent specialists such students may be required to devote a small part of their time to assisting the regular college instructors in laboratory instruction. This course leads to the degree of Master of Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the Faculty.

Some of the subjects offered to the graduate students are:

Advanced Calculus

Differential Equations

Long Distance Transmission

Design and Control of Electric Power Systems of Very Great Magnitude

Electric Railway and Traction, continued

Modern Theory of Electrical Engineering, continued

Oscillating Currents and High Frequency Phenomena

Transient Phenomena

Lightning and Lightning Protection

Wave Transmission, with Special Application to Telephony

Scientific Foundations of Electrical Engineering

Electro-Chemistry

Chemistry of Very High Temperature

Light and Illumination

Laboratory

Research Work

Some of the lectures given by Professor Charles P. Steinmetz for Graduates are as follows:

Review: The Electric, Magnetic and Dielectric Circuit. Resistance, Inductance, Capacity and Wireless Telegraphy.

The Law of Electromagnetic Induction; Electric Apparatus and Machines.

The Characteristic Curves of Electrical Apparatus, Machines and Circuits, Magnetic Characteristic: Saturation and Excitation Curve. Load Characteristic: Regulation Curve, Field Characteristic, Compounding Curve. Phase Characteristic of Alternating Current Apparatus; Efficiency, No Load and Load Losses.

Commutating Machines: Direct Current Generators and Motors.

Synchronous Machines: Alterators and Synchronous Motors and Converters.

Induction Machines: Induction Motors and Generators, Single Phase and Polyphase Repulsion Motors and Generators.

Rectifying Machines: The Arc Machine, Constant Potential and Constant Current Rectification, Arc Rectifiers, and Electrolytic Rectifiers.

Transformers and Reactors: Constant Potential and Constant Current.

Meters. Indicating, Integrating and Recording.

Transient Phenomena: Starting and Building Up of Direct Current Generators; Effect of Field Inductance and Fluctuating Load. Starting of Synchronous Machines.

Starting of Transformers, of Inductive Circuits, of Circuits containing Inductance and Capacity, Transmission Lines, Short Circuit Phenomena of Circuits containing Inductance and Capacity. Transmission Lines, Short Circuit Oscillations.

Short Circuit Current of Direct and Alternating Current Generators.

Hunting or Surging of Synchronous Machines, Motors and Converters. Hunting or Surging of Induction Machines, of Direct Current Motors and Generators.

Alternating Current Series Motors.

In addition to this a course is given on the design of electrical apparatus, in which the students carry out the design of a number of typical machines and apparatus under the personal direction of Professor Steinmetz; and the course includes the discussion of all the elements entering into the practical design and construction.

Correspondence regarding admission to the undergraduate courses should be addressed to the Secretary of the Faculty. Correspondence regarding admission to the graduate course in Electrical Engineering may be addressed to

CHARLES P. STEINMETZ
Professor of Electrical Engineering
Schenectady, New York

CURRICULUM OF THE B. E. COURSE[1]

GENERAL ENGINEERING

	First Term	Second Term	Third Term
Freshman Year[2]	3 French 3 German 2 Rhetoric 3 Freehand Drawing 4 Algebra 1 Physiology Lectures	3 French 3 German 2 Rhetoric 4 Analytic Geometry 2 Mensuration 3 Mechanical Drawing 1 Gymnastics Lectures	3 French 3 German 2 Rhetoric 2 Calculus 3 Analytic Geometry 2 Surveying and Plotting 1 Trigonometry 1 Physiology Two and one-half Weeks' Field and Laboratory Work, following Commencement Summer vacation Work
Sophomore Year[2]	1 Rhetoric 3 Calculus 4 Mechanics 3 Physics 3 Chemistry 3 English Literature 1 Hygiene	1 Rhetoric 3 Calculus 2 Mechanics 4 Physics 3 Chemistry 2 English Literature 3 Descriptive Geometry	1 Rhetoric 2 Calculus 1 Mechanics 4 Physics 5 Chemistry 3 Topographical Surveying 3 Descriptive Geometry; Shades and Shadows Two and one-half Weeks' Field and Laboratory Work, following Commencement. Summer Vacation Work

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]Identical in General, Sanitary and Electrical Engineering courses.

CURRICULUM OF THE B. E. COURSE[1]

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Junior Year[2]	1 Rhetoric 2 American History 4 Applied Mechanics 3 Chemical Laboratory 4 Highways and Pavements 3 Topographical Surveying and Mapping	1 Rhetoric 2 American History 5 Mechanics of Materials and Eng. Laboratory 3 Kinematics Machine Drawing 3 Electricity 2 Thermodynamics 1 Natural Perspective	1 Rhetoric 2 American History 4 Stresses in Structures and Graph. Analysis 3 Hydraulics 3 Route Surveying 3 Spher. Trigonometry and Astronomy 2 Stereotomy Inspection Trips Two and one-half Weeks' Field and Laboratory Work following Commencement Summer Vacation Work
Senior Year	3 Economics 5 Railroad and Trolley Road Construction 4 Engineering Stresses 2 Economic Geology 2 Motors and Motive Power 2 Outlines of Architecture One Literary Essay One Technical Essay Inspection Trips	2 Sanitary Biology 3 Method of Least Squares 4 Engineering Design and Construction 2 Water Supply Engineering 3 Motors and Motive Power 2 Building Construction One Literary Essay One Technical Essay	3 Engineering Law and Procedure 3 Geodesy and Field Astronomy 5 Engineering Design and Construction 5 Water Supply Sewerage and Sewage Disposal Thesis

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]The Junior Year is identical in General and Sanitary Engineering courses.

CURRICULUM OF THE B. E. COURSE[1]

GENERAL ENGINEERING, OPTION B

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 2 English History 4 Applied Mechanics 4 Highways and Pavements 3 Chemical Laboratory 3 Topographical Surveying and Mapping	1 Rhetoric 2 American History 2 English History 3 Elements of Law 5 Mechanics of Materials and Eng. Laboratory 3 Electrical Machinery 2 Thermodynamics	1 Rhetoric 2 American History 2 French History 3 Law of Property and Contracts 4 Stresses in Structures and Graph. Analysis 3 Route Surveying 3 Hydraulics Inspection Trips Two and one-half Weeks' Field and Laboratory Work, following Commencement Summer Vacation Work .
Senior Year	3 Economics 2 Political Science 3 Principles and Law of Corporations 2 Motors and Motive Power 4 Engineering Stresses 2 Outlines of Architecture 2 Economic Geology One Literary Essay One Technical Essay Inspection Trips	3 Sociology 2 Political Science 2 Principles of Finance and Financial Operations 3 Motors and Motive Power 4 Engineering Design and Construction 2 Water Supply Engineering 2 Building Construction One Literary Essay One Technical Essay	3 Sociology 2 International Law 3 Principles of Administration 5 Engineering Design and Construction 3 Principles of Accounting Thesis

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE[1]

SANITARY ENGINEERING

[The Freshman, Sophomore and Junior years of this course are identical with those years in the General Engineering Course following "Option A."]

SENIOR YEAR

First Term	Second Term	Third Term
2 Motors and Motive Power	3 Motors and Motive Power	3 Engineering Law and Procedure
4 Engineering Stresses	4 Engineering Design and Construction	5 Engineering Design and Construction
3 Heating and Ventilation	2 Water Supply Engineering	5 Sewerage Sewage Disposal
3 Chemical Laboratory	2 Chemical Laboratory	1 House Draining and Plumbing
2 Economic Geology	2 Sanitary Biology	1 Sanitary Codes and Laws
3 Economics	3 Electives[2]	2 Electives[2]
One Literary Essay	One Literary Essay	Thesis
One Technical Essay	One Technical Essay	
Inspection Trips	Inspection Trips	

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

[2]For list of electives, see pages 80–82.

CURRICULUM OF THE B. E. COURSE[1]

ELECTRICAL ENGINEERING

For the general plan of course, see page 108.
Freshman and Sophomore Years as in General Course, page 122.

JUNIOR YEAR

First Term	Second Term	Third Term
1 Rhetoric	1 Rhetoric	1 Rhetoric
1 Seminar	1 Seminar	1 Seminar
2 American History	2 American History	2 American History
2 Direct Current Laboratory	2 Electrical Laboratory	2 Electrical Laboratory
1 Mathematics	1 Mathematics	1 Mathematics
3 Direct Current Circuit and Apparatus	3 Direct Current Circuit and Apparatus	2 Elect. Apparatus Design
3 Hydraulics and Hydraulic Design	2 Hydraulic Turbine	2 Elements of Civil Engineering
4 Applied Mechanics	3 Theory of Steam Engine	2 Steam Engine Design
	3 Altern. Cur. Circuits and Apparatus	3 Altern. Cir. Circuits and Apparatus
3 Analytic Chemistry	1 Natural Perspective	3 Electric Lighting
		Summer Vacation Work

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE[1]

ELECTRICAL ENGINEERING

For the general plan of the course, see page 108.
Freshman and Sophomore Years as in General Course, see page 122.

SENIOR YEAR

First Term	Second Term	Third Term
3 Economics	2 Electro-Chem.	3 Engineering Law and Procedure
2 Electrical Laboratory	2 Electrical Laboratory	2 Electrical Engineering Theory
2 Electrical Engineering, Theory	2 Electrical Engineering Theory	3 Transmission and Distribution
3 Transmission and Distribution	3 Transmission and Distribution	3 Elect. Apparatus Design
2 Elect. Apparatus Design	3 Elect. Apparatus Design	1 Tech. Literature
1 Tech. Literature	1 Tech. Literature	1 Seminar
1 Seminar	1 Seminar	2 Electrical Engineering Practice
3 Thermodyn. Gas Eng. and Steam Turb.	2 Electrical Engineering Practice	2 Electric Railway
3 Altern. Cur. Circuits and Apparatus	2 Electric Railway	5 Thesis
1 Thesis	3 Altern. Cur. Circuits and Apparatus	
One Literary Essay	1 Thesis	
One Technical Essay	One Literary Essay	
	One Technical Essay	

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE[1]

GENERAL ENGINEERING

Entrance requirements are the same as for General Engineering Course and Latin-Scientific Course

First Year	4 *Fr* Latin	*ls*	**First Year**	4 *Fr* Latin	*ls*	**First Year**	4 *Fr* Latin	*ls*
	3 *Fr* French or German[2]	*ls & e*		3 *Fr* French or German[2]	*ls & e*		3 *Fr* French or German[2]	*ls & e*
	2 *Fr* Rhetoric	*ls & e*		2 *Fr* Rhetoric	*ls & e*		2 *Fr* Rhetoric	*ls & e*
	4 *Fr* Algebra	*e*		4 *Fr* Anal. Geom.	*e*		2 *Fr* Anal. Geom.	*e*
	3 *Fr* Free Hand Drawing	*e*		2 *Fr* Mensuration	*e*		3 *Fr* Calculus	*e*
	1 *Fr* Physiology Lectures	*ls & e*		1 *Fr* Physiology	*ls*		1 *Fr* Physiology	*ls & e*
				1 *Fr* Gymnasium Lectures	*ls & e*		2 *Fr* Surveying	*e*
							Summer Vacation Work	
Second Year	3 *So* Latin	*ls*	**Second Year**	3 *So* Latin	*ls*	**Second Year**	3 *So* Latin	*ls*
	3 *Fr* German or French[2]	*ls & e*		3 *Fr* German or French[2]	*ls & e*		3 *Fr* German or French[2]	*ls & e*
	2 *So* English & Rhet.	*ls*		3 *So* English & Rhet.	*ls*		3 *So* English & Rhet.	*ls*
	3 *So* Calculus	*e*		3 *So* Calculus	*e*		2 *So* Calculus	*e*
	2 *So* Surveying	*e*		3 *So* Chemistry	*ls & e*		5 *So* Chemistry	*e*
	3 *So* Chemistry	*ls & e*		3 *Fr* Mechanical Drawing	*e*		1 *Fr* Trigonometry	*e*
	1 *So* Hygiene	*ls & e*					Summer Vacation Work	

	First Term	Second Term	Third Term
Third Year	3 *So* German or French[2] *ls & e* 3 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *Jr* Chem. Lab'y *e* 2 *So* English Hist. *ls* 3 *So* Mechanics *e*	3 *So* German or French[2] *ls & e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* English Hist. *ls* 2 *So* Mechanics *e*	3 *So* German or French[2] *ls & e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* French Hist. *ls* 1 *So* Mechanics *e* 3 *So* Topog. Surv. *e* Summer Vacation Work
Fourth Year	4 *Jr* App. Mechanics *e* 5 *Jr* Topog. Surv. *e* 3 *Jr* Logic *ls* 3 *EJr* American Hist.[3] *ls* 3 *Jr* Biology *ls*	5 *Jr* Mechs. of Mat. and Eng. Lab'y *e* 2 *Jr* Thermodyn's *e* 3 *Jr* Psychology *ls* 3 *EJr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *Jr* Nat. Perspec. *e* 1 *So* Elec. Lab'y *e*	4 *Jr* Stresses *e* 3 *Jr* Hydraulics *e* 3 *Jr* Ethics *ls* 3 *EJr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *So* Elec. Lab'y *e* Summer Vacation Work

[1] The figure at the left indicates the number of hours per week devoted to class work in the subject. *Fr.*—Freshman work, *So.*—Sophomore work, *Jr.*—Junior work; *ls* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

[2] Students offering French at entrance will take French during the first year and German during the second and third years; but students offering German at entrance will take German during the first and second years and French during the third year.

[3] Subjects preceded by *E* are taken from the elective list, but are required in this course.

After the completion of the fourth year, students in this course are given the choice of two optional courses A and B. The details of these optional courses are here given.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE[1]

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Fifth Year	3 *ESr* European Hist.[2] *ls* 2 *ESr* Comparative Politics[2] *ls* 3 *Sr* Economics *ls & e* 4 *Sr* Stresses *e* 2 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *EJr* Gen. Geology *ls*	3 *ESr* European Hist.[2] *ls* 2 *ESr* Comparative Politics[2] *ls* 3 *Sr* Sociology *ls* 3 *Jr* Kinematics and Machine Draw. *e* 3 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *Jr* Elect. Machinery *e*	3 *ESr* European Hist.[2] *ls* 2 *ESr* Internat. Law[2] *ls* 3 *Sr* Sociology *ls* 3 *Jr* Route Surv. *e* 3 *Jr* Spher. Trigon. and Astronomy *e* 1 *Sr* Rhetoric *ls* 2 *Jr* Stereotomy *e* Summer Vacation Work
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ. *e* 2 *Sr* Outlines of Architecture *e* 3 *Sr* Principles of Aesthet. Design 1 *Jr* Elements of Law *e* 2 *Sr* Econ. Geology *e* 3 *Jr* Highways and Pavements *e*	4 *Sr* Eng. Design *e* 2 *Sr* Water Supply *e* 2 *Sr* Build. Const'n *e* 2 *Jr* Elements of Law *e* 3 *Sr* Least Squares *e* 3 *Sr* Bacteriology	5 *Sr* Eng. Design *e* 5 *Sr* Water Supply and Sewerage *e* 3 *Jr* Law of Prop. and Contracts *e* 3 *Sr* Geodesy and Field Astron. *e* Thesis

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*—Junior work, *Sr.*—Senior work; *ls.* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

[2]Subjects preceded by *E* are taken from the elective list, but are required in this course.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE[1]

GENERAL ENGINEERING, OPTION B

	First Term		Second Term		Third Term	
Fifth Year	3 *ESr* European Hist.[2]	*ls*	3 *ESr* European Hist.[2]	*ls*	3 *ESr* European Hist.[2]	*ls*
	2 *ESr* Comparative Politics[2]	*ls*	2 *ESr* Comparative Politics[2]	*ls*	2 *ESr* Internat. Law[2]	*ls*
	3 *Sr* Economics	*ls* & *e*	3 *Sr* Sociology	*ls*	3 *Sr* Sociology	*ls*
	1 *Sr* Rhetoric	*ls*	1 *Sr* Rhetoric	*ls*	1 *Sr* Rhetoric	*ls*
	1 *Jr* Elements of Law	*e*	2 *Jr* Elements of Law	*e*	3 *Jr* Law of Prop. and Contracts	*e*
	4 *Sr* Stresses	*e*	3 *Jr* Elec. Machinery	*e*	3 *Jr* Route Survey	*e*
	2 *Sr* Econ. Geology	*e*	3 *Sr* Motors and Motive Power	*e*	2 *Jr* Stereotomy	*e*
	2 *Sr* Motors and Motive Power	*e*			Summer Vacation Work	
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ.	*e*	4 *Sr* Eng. Design	*e*	5 *Sr* Eng. Design	*e*
	3 *Sr* Prin. of Law of Corporations	*e*	4 Eng. Projects		5 *Sr* Water Supply and Sewerage	*e*
	2 *Sr* Outlines of Architecture	*e*	2 *Sr* Prin. of Finance and Financial Operations	*e*	3 *Sr* Principles of Accounting	*e*
	3 *Sr* Prin. of Aesthet Design		2 *Sr* Building Construction	*e*	3 *Sr* Principles of Administration	*e*
	3 *Jr* Highways and Pavements	*e*	2 *Sr* Water Supply	*e*	Thesis	
			3 *Sr* Bacteriology			

[1]The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*—Junior work, *Sr.*—Senior work; *ls.* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

[2]Subjects preceded by *E* are taken from the elective list, but are required in this course.

UNION COLLEGE

REGULATIONS AND GENERAL INFORMATION

ATTENDANCE AND STANDING

Registration. Every student must report at the Registrar's office at the beginning of each term and register college or local residence. Any change of residence during the term must be reported at once, in conformity with the regulation made by the Treasurer's office.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept, and is transmitted at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the three highest marks for the whole course in the Engineering Department and the seven highest marks in the other departments are entitled to appointment as Commencement Orators.

Absences in General. Absences are entered (in every course) against a student from the beginning of a term until he reports his return to the Registrar.

Absences are recorded as of three kinds:—allowed, excused and unexcused. Excuses must be obtained from the Committee on Absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required; and it is expected that no student will be absent, except in case of unavoidable necessity. To provide for such cases of necessity students are allowed, each term, as many absences without excuse, in any subject, as there are recitations per week in that subject. But this rule does not apply to examinations, or to recitations just before or after any vacation or recess, or to any class as a whole at any time, and is not to be interpreted as remitting any part of the total work of the term.

After the limit set in the last paragraph has been reached, however, as well as in those cases where the rule as stated does not apply, excuses may be granted only by the Absence Committee of the Faculty. No excuse will be granted except for protracted illness, or for reasons in every way exceptional; and no excuse will be given to provide for difficulties caused by the use of the allowance for unnecessary purposes. No excuse remits any work of the term.

The work lost by reason of an allowed absence or an excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

Any absence not allowed or excused counts as a failure.

After a number of unexcused absences equal to two weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

In the determination of a student's general standing marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students admitted with entrance conditions are required to remove them not later than the examination for the removal of conditions in the following March. Students who fail to meet this requirement are classed as irregular students. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the Faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No Senior who has failed to make up all his back work by the end of the second term of Senior year can be recommended for a degree, except by special vote of the Faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Saturday in December, March and May, as indicated in the College calendar. Registration for these examinations closes at 2:30 p. m. on the Wednesday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the College Office.

Students who have been excused by the Dean, in writing, from any term examination are reported "not examined" and may be examined later, at the option of the instructor, but such examination cannot be postponed beyond the first conditions examinations. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the Dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the Faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave a prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the Faculty.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Matriculation fee	$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term	25.00
Tuition, Engineering courses, per term	40.00
Graduate course in Electrical Engineering, per term	50.00
Room rent, per year, North College.....$50. to	60.00
South College, per year	60.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term	8.00
Graduation fee, including diploma	15.00
Chemical laboratory fees:	
Required course, No. 1 or No. 1a, per term	8.00
Required course, No. 2, in Civil, Sanitary and Electrical Engineering, Junior year	15.00
Required course, No. 5, in Sanitary Engineering, Senior year	15.00
Elective courses, No. 2, No. 3 or No. 4, per term	15.00
Electrical Engineering laboratory fee, per term .....$2.00 to	10.00
Biological laboratory fees:	
Required course, No. 1, per term	2.00
Required course, No. 5, per term	3.00
Elective courses, No. 2 or No. 3, per term	6.00
Physical laboratory fees:	
Required course, No. 2, per term	4.00
Elective course, No. 1a, per term	5.00
Conditions examination fee	2.00
Fee for certificate of work done	2.00
Fee for certificate of graduation	1.00
Master's Degree, Registration and diploma	20.00

Students who take part of their Senior year's work at the Albany Medical College as provided on page 64 are charged

$125 for the year's tuition, $50 to be paid to the Treasurer of Union College and $75 to the Treasurer of the Albany Medical College.

Tuition and other fees are due on the first day of each term.

Students must conform to the rules of the Treasurer's office regarding registration at the opening of each term, and will not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to College property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for $3.50 to $5 a week.

It is the custom of the student body to levy an annual campus tax of eleven dollars, five dollars of which is payable at the beginning of the fall term, three dollars at the beginning of the winter term, and three dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics consisting at present of foot ball, base ball, basket ball and track.

College Rooms

The College has two steam heated dormitories, accommodating ninety students. Most of the rooms are arranged in suites of two, and all are unfurnished; they are rented at prices varying from $50.00 to $60.00 per year for each student occupying a room. The rooms are cared for by competent persons, employed and paid by the college. No room is secured until a lease is signed and filed in the College Office.

A student must occupy the room for which he signs, as transfers are not allowed. Each occupant of a College room will be held responsible for any damage done to the room. Students about to enter College who wish rooms in the dormitories should make early application to the Assistant Treasurer. On application, a list of rooms, giving location and price, will be furnished. It is very desirable that students about to enter College should secure their own room-mates before the College year opens. When this is not done the men will be located in the order of application. At the end of the College year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following Commencement Day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

Employment Committee

A Committee of the Faculty has been appointed to give assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from $2 to $4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the committee may be addressed to the Chairman, Prof. James H. Stoller.

SCHOLARSHIPS

Funds given especially for this purpose enable the College to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation. (Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.)

2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.

3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Application blanks will be provided by the President or Dean upon request.

John David Wolfe Memorial Scholarships

The income of a Fund of Fifty Thousand Dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the Southern States.

The scholarships are governed by the conditions named above.

Application blanks will be provided by the President or Dean upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding about one hundred and fifty dollars a year, each; this provides for tuition and a money payment each term.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the State of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton County.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton County.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. To blood relatives living in any other part of the United States.

Nomination to scholarships is made by the Board of Directors of the Gloversville Free Library; and the nominees must pass satisfactory examinations at the College. Applications are received by the Directors of the Gloversville Free Library, Gloversville, N. Y.

These scholarships are governed by the conditions named on page 141.

Thomas Armstrong Scholarships

The late Thomas Armstrong of Plattsburgh, N. Y., provided for the grant of scholarships to residents of Clinton County, sons of practical farmers. Nominations to these scholarships are made by the Board of Supervisors of Clinton County, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this fund, amounting to two hundred dollars per year, will be awarded as a prize scholarship, upon the following conditions:

Conditions governing the award of the R. C. Alexander Prize Scholarship

1. Candidates must be students in the Classical course, and of approved moral character.

2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the Freshman year.

3. They must pass successfully a special examination at the close of the Freshman year in each of the following subjects: Latin, Greek, Mathematics, English Composition, and either French or German. These examinations will be based upon the work of the Freshman year.

4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of his college course.*

*This scholarship is now held by Elmer Wallace K Mould, of the class of 1909, and will be awarded next to a member of the class of 1912.

5. The Prize Scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.

6. All questions pertaining to the administration of this scholarship will be determined by a committee composed of the President of the College, the Chairman of the Scholarship Committee of the Faculty, and a member of the Board of Trustees.

Horace B. Silliman Scholarships

Three scholarships have been founded by the Hon. Horace B. Silliman, class of '46, giving to each recipient the income from two thousand dollars ($2,000) annually.

These scholarships are to be awarded to active members of the college Young Men's Christian Association by a Committee composed of the President, the Dean, and the President of the Young Men's Christian Association, under such rules and conditions as shall be determined by such Committee, preference being given to students in the Classical course.

The award is made to one student annually at the close of the Freshman year.

Law School Scholarships

Applicants for these scholarships, described below, must register at the College office by May 1st of Senior year.

John K. Porter Memorial Scholarships

A fund given by Mrs. John K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards will be made at Commencement to Seniors chosen by the Faculty.

Gilbert M. Speir Memorial Scholarship

A fund given by Mrs. Glover C. Arnold, in memory of her father, the late Judge Gilbert M. Speir, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University.

The sum of ninety dollars will be awarded at Commencement to the Senior chosen by the Faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on $1,000, which are given to the two members of the graduating class who deliver at Commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the Trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horatio G. Warner, LL. D., of Rochester, N. Y., founded an annual prize, consisting of silver plate of the value of $28, to be presented at Commencement to the "graduate of Union College, Classical course, who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is awarded by the Faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of $1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at Commencement to that Senior connected with the College for not less than two years who shall offer the best essay on one of two assigned subjects in English Literature or History.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a

sealed envelope; the signature and the name of the prize being given on the outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of $1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the Senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham Essay) by noon on May 15th. The prizes are awarded at Commencement.

The Rankine Prize for Extemporaneous Speaking

A prize of $50 in money is awarded to that member of the College who shall deliver the best extemporaneous speech at a public competition to be held in Commencement week in each year. The award is made by a committee, and is based on the following considerations: (1) The appropriateness and correctness of the subject matter; (2) the logical force of the argument; (3) the excellence of the style; (4) the grace and effectiveness of the delivery. All students in regular standing are eligible. The number of competitors is, however, limited to ten.

Oratorical Prizes

Prizes are presented at Commencement to the two Juniors and the two Sophomores who deliver the orations best in composition and delivery on the occasion of Prize Speaking in Commencement week. Four Juniors and four Sophomores are selected for this competition by a committee of the Faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prize

Founded by George F. Allison, of New York city, and Wallace T. Foote, of Port Henry, N. Y., for the encouragement of debate in the Literary Societies. The prize consists of $100 in cash, and is to be awarded as the result of a public competition between representatives of the Adelphic and Philomathean Literary Societies. Fifty dollars will be awarded to the society presenting the strongest argument. The remaining $50 will be awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are to be left to the determination of a committee, consisting of the President, the Dean of the College, and the Professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of $1,000, the interest of which is devoted to a prize for conduct and character, without respect to scholarship, to be given at Commencement to a Senior who shall have passed through a full course of four years at the College.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the College Treasurer, and returned all books borrowed from the College Library; he must also attend the conferring of Degrees, or be expressly excused therefrom. The candidate for a bachelor's degree must have entered college before the end of the first Senior term.

Degrees for Resident Study

The degrees of the College are conferred by authority of the Board of Trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree

The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 33; the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 33; the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 33; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, 6 or 7, pages 33, 34; the degrees of Bachelor of Engineering and Bachelor of Philosophy, upon those who have successfully completed Course 5, page 34.

The Master's Degree

The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 8, page 34; the degree of Master of Electrical Engineering, upon those who have successfully completed Course 9, page 35.

Degrees for Non-Resident Study

The degree of Master of Arts or of Master of Science will be given to graduates of Union College who have been registered as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfilment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register his name, address, and the two departments chosen, with the Dean of the College not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the Dean by May 1st for submission to the Faculty in time to provide for all necessary examinations before commencement.

A fee of $20 is charged, which covers examinations and diploma; of this amount $10 is payable at the time of registration and $10 at the time of the final examinations.

Honors

All commencement prizes are limited to A. B., Ph. B., or B. S. students who have entered at or before the beginning of the Senior year, and who are in full standing at the close of the second term; and to Engineering students entered likewise and in full standing at the close of the second term, in both the Engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments

These honors are assigned to ten Seniors on the basis of scholarship, as stated under Standing, page 134. Provi-

sional appointments are made at the close of the second term Senior, and become final if those who receive them retain the same relative rank to the end of their course. Under present regulations, no other persons can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive commencement appointments as the result of the third term's work are excused from speaking unless the Faculty direct otherwise.

The Valedictory

This honor is awarded to the Senior of highest standing among the ten receiving Commencement appointments.

Special Honors

Special Honors are also given at graduation in each of the following subjects: Greek, Latin, English Language, English Literature French, German, Mathematics, Physics, Chemistry, Biology, Economics, History, Sociology and Philosophy. The work required in each case will be equivalent of three terms of class-room work of two hours per week each, and will be outside of the prescribed or elective courses. The candidate for Special Honors must apply to the head of the department in which he proposes to take Honors not later than the first Monday of the Spring term of the Junior year. He must have attained in all the studies of the department in which he tries for Honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the Senior year to the Faculty, who shall decide in each case whether the work done is worthy of an Honor. The Honors attained are stated in the diploma, and the names of the students who take Honors are printed on the Commencement programme.

Phi Beta Kappa Society

At the end of the third term of the Senior year, one-third of the members of the graduating class in the Classical course, candidates for the degree of Bachelor of Arts, may be elected to membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given, as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York Chapter was established in 1817; and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma XI

Election to the honorary scientific Society of Sigma XI, is one of the honors open to Seniors of marked ability in the Scientific and Engineering departments. Membership is confined to the Faculty, Senior candidates for graduation, and Alumni. The election occurs during the latter part of the Senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The Society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED

AT THE

ONE HUNDRED AND TWELFTH ANNUAL COMMENCEMENT

June 10, 1908

Honorary

LL. D.

John Franklin Fort.....Newark, N. J.
Charles Evans Hughes.....Albany
Simon W. Rosendale.....Albany

D. D.

Putnam Cady.....Amsterdam
James Cantine.....Muscat, Arabia

Sc. D.

Charles Horton Peck.....Albany

D. C. S.

Joseph French Johnson.....New York

L. H. D.

Andrew Van Vranken Raymond.....Buffalo

Art. D.

Frank Bailey.....New York

In Course

A. M.

Harvey Clements, 1895.....Schenectady
Meade LaFayette Zimmer, 1906.....Albany

M. E. E.

John T. Appleton.....Manchester, Eng.

B. S.

Edward Patrick McKeefe.....Albany
(as of the class of 1898)

B. E.

Edward J. Fairbairn.....Buffalo
(as of class of 1907)

Class of 1908

A. B.

Albert Willard Clark.....Schenectady
Hiram Thomas Hildreth.....Herkimer
Herman Lewis Meyer.....Green Island
Andrew V. V. Raymond, Jr.....Buffalo
Mark Skinner Watson.....Plattsburg

Ph. B.

Henry Winne Bell.....Albany
Arthur Edgar Davies.....Schenectady
Chester G. Fullerton.....Schenectady
Arthur Beach King.....Troy
Edwin L. LaCrosse.....Schenectady
Walter Scott McNab.....Schenectady
Martin Henry Weyrauch.....Liberty
Joseph Thacher Wright.....Pulaski

B. S.

Thomas Edward Hanigan.....Schenectady
James P. Minahan.....Schenectady
Levi Parsons.....Gloversville
Ross Williams Tiffany.....Schenectady

B. E.

Thomas Sherwood Bailey.....Burnt Hills
James Edward Bell.....Westmoreland
Emanuel Herbert Bocian.....Chicago, Ill.
Walter John Clark.....Middleburg
Willard D. Covey.....Lyons Falls
Michael J. J. Dwyer.....Troy
John Benjamin Flowers.....Schenectady
David Grant.....Green Island
Leon C. Heilbronner.....Schenectady
Ferdinand Helm.....Saratoga Springs
William D. Hildreth.....Herkimer
Leland Silas Hoffman.....St. Johnsville
Harold Warner Jewell.....Schenectady
Alexander Dorn Kline.....Schenectady
Albert Southard Knight.....Round Lake
Augustine Marx.....Amsterdam
Arba Romans Morse.....Sidney Centre
John Frederick Nash.....Plattsburg
Frederick Royal Peck.....Deansboro
Edward Penrose, Jr.....Cohoes
Frank R. Stevens.....Mechanicville
Wayne R. Vandergrift.....Newport News, Va.
Carl H. Vogt.....Buffalo
Royton F. Wheadon.....Johnstown

AWARDS

Valedictory

Leland Silas Hoffman.....St. Johnsville

Commencement Orations

Arthur Edgar Davies.....Schenectady
Thomas Edward Hanigan.....Schenectady
Arthur Beach King.....Troy
Edwin L. LaCrosse.....Schenectady
Herman Lewis Meyer.....Green Island
Mark Skinner Watson.....Plattsburg
Martin Henry Weyrauch.....Liberty

Engineering Theses

Emanuel Herbert Bocian.....Chicago, Ill.
Leland Silas Hoffman.....St. Johnsville
Augustus Marx .....Amsterdam
Edward Penrose, Jr.....Cohoes
Frank R. Stevens.....Mechanicville

Special Honors

In Biology.....Arthur E. Davies
In English Literature.....Edwin L. LaCrosse
In French.....Arthur E. Davies
In Philosophy.....Henry W. Bell
Thomas E. Hanigan
Mark S. Watson
Martin H. Weyrauch

Warner Prize

Mark Skinner Watson

Blatchford Oratorical Medals

1st. Mark S. Watson
2d. Arthur B. King

Ingham Prize

Mark S. Watson

Allen Essay Prizes

1st. Martin H. Weyrauch
2d. Thomas E. Hanigan
3d. Arthur E. Davies.

Daggett Prize

Frank R. Stevens

Junior Oratorical Prizes

1st. John W. Faust
2d. James B. Welles

Sophomore Oratorical Prizes

1st. Arthur R. Chaffee
2d. Harry G. Coplon

Allison-Foote Prizes

Won by the Philomathean Society
and
Elmer K. Mould
Class of 1909

R. C. Alexander Prize Scholarship

Elmer Wallace K. Mould
Class of 1909

John K. Porter Memorial Scholarships

Thomas E. Hanigan
Arthur B. King
Edwin L. LaCrosse

Gilbert M. Speir Memorial Scholarship

Arthur Edgar Davies

The Rankine Prize for Extemporaneous Speaking

Elmer Wallace K. Mould

Sigma XI

Emanuel Herbert Bocian
Arthur Edgar Davies
Thomas Edward Hanigan
Leland Silas Hoffman
Augustus Marx
Edward J. Penrose
Frank R. Stevens
Wayne A. Vandegrift

ALBANY MEDICAL COLLEGE

ALBANY, NEW YORK

MEDICAL DEPARTMENT

UNION UNIVERSITY

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle Street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, pathology, bacteriology, experimental physiology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Incurables, County Hospital, South End Dispensary, Eye and Ear Infirmary, Albany Orphan Asylum, and dispensaries connected with each, are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the Albany Hospital, and other hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

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SIMON W. ROSENDALE

Vice-President
ALDEN CHESTER

Treasurer
JOHN H. JACKSON

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EDWARD BOWDITCH	ROBERT OLCOTT

GEORGE ALEXANDER

MAYOR OF ALBANY
RECORDER OF ALBANY
} Ex-Officio.

Catalogues are sent with care, and graduates of the college changing their post-office address, or not receiving them, will please notify

WILLIS G. TUCKER, M. D., *Registrar*
Albany Medical College
Albany, New York

FACULTY

GEORGE ALEXANDER, D. D.
Chancellor ad interim of the University

ALBERT VANDER VEER, M. D., PH. D.
Professor of Surgery

JOHN MILTON BIGELOW, M. D., PH. D.
Emeritus Professor of Materia Medica, Therapeutics and Diseases of the Throat and Nose

SAMUEL BALDWIN WARD, M. D., PH. D., DEAN
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WILLIAM HAILES, M. D.
Anthony Professor of Pathological Anatomy, Histology and Fractures and Dislocations

CYRUS STRONG MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC COLTON CURTIS, M. D.
Professor of Dermatology

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL ROSEBURGH MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

HERMON CAMP GORDINIER, M. D.
Professor of Physiology

HOWARD VAN RENSSELAER, M. D.
Professor of Materia Medica and Therapeutics, and Adjunct Professor of Theory and Practice of Medicine

JOSEPH DAVIS CRAIG, M. D.
Professor of Anatomy, and Curator of the Museum

WILLIS GOSS MACDONALD, M. D.
Professor of Abdominal and Clinical Surgery

ANDREW MacFARLANE, M. D.
Professor of Physical Diagnosis and Medical Jurisprudence

ARTHUR GUERNSEY ROOT, M. D.
Professor of Diseases of the Throat and Nose

LEO HAENDEL NEUMAN, M. D.
Professor of Gastro-Enteric Diseases, and Clinical Professor of Theory and Practice of Medicine

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HERMAN BENDELL, M. D.
Otology.

JESSE MONTGOMERY MOSHER, M. D.
Insanity, Neurology and Electro-Therapeutics

HARRY JUDSON LIPES, M. D.
Obstetrics

EDGAR ALBERT VANDER VEER, M. D.
Surgery

ARTHUR WELLS ELTING, M. D.
Surgery and Lecturer on Surgical Pathology

JOHN ALBERTSON SAMPSON, M. D.
Gynecology

ARTHUR SAUTTER, M. D.
Dermatology and Lecturer on Genito-Urinary Diseases

GEORGE EMORY LOCHNER, M. D.
Gynecology

CLEMENT FRANK THEISEN, M. D.
Diseases of Throat and Nose

HENRY LARNED KEITH SHAW, M. D.
Diseases of Children

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Materia Medica

HOLMES CONDICT JACKSON, PH. D.
Physiological Chemistry and Director of Laboratory

S. BURT WOLBACH, M. D.
Pathology and Bacteriology

Lecturers

WILLIAM OLIN STILLMAN, M. D.
History of Medicine

ARTHUR TURNER LAIRD, M. D.
Clinical Microscopy

CHARLES HENRY MOORE, M. D.
Ophthalmology and Otology

HERBERT DODGE PEASE, M. D.
Antitoxins and Immunity

JAMES FRANCIS ROONEY, M. D.
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Neurology

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Experimental Physiology

ARTHUR JOSEPH BEDELL, M. D.
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Theory and Practice, Demonstrator of Anatomy

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Oral Pathology

MARCUS DENIS CRONIN, M. D.
Pathology and Bacteriology

EDWARD JAMES BUCHAN, M. D.
Pathology and Bacteriology

JOSEPH LEWI DONHAUSER, M. D.
Surgery

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MICHAEL DANIEL STEVENSON, M. D.
WASHINGTON IRVING GOEWEY, M. D.
ELIJAH HUDSON RIDER, M. D.
WILLIAM PITNEY BRIERLEY, M. D.
GEORGE WASHINGTON PAPEN, JR., M. D.
WILLIAM GRANT LEWI, M. D.
MARTIN MACHARG, M. D.
LOUIS LEBRUN, M. D.
JAMES MANNING MOORE, M. D.
GEORGE STEPHEN MUNSON, M. D.
JOSEPH PATRICK O'BRIEN, M. D.
JOSEPH AMBROSE COX, M. D.
MILES AMBROSE MCGRANE, M. D.
FREDERIC CHARLES CONWAY, M. D.
THEOBALD FREDERICK DOESCHER, M. D.
DANIEL VINCENT O'LEARY, JR., M. D.
AGNES ELIZABETH PAGE, M. D.
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WILLIAM LESLIE MUNSON, M. D.
SAMUEL PIERSON BRUSH, M. D.
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GEORGE PHILO PITKIN, M. D.
FRED J. BARNET, M. D.
EARL WILLIAM FULLER, M. D.
JOSEPH DAVIS, M. D.
ROBERT COPELAND MOONEY, M. D.
EDWARD JOHN RILEY, M. D.
NELSON KAUFMAN FROMM, M. D.
JOHN PAUL O'KEEFFE, M. D.

CALENDAR 1908-1909

1908

Regular winter session begins.....Tuesday, September 22
Thanksgiving vacation begins....Wednesday, November 25
Lectures resumed .....Monday, November 30
Christmas vacation begins.....Wednesday, December 23

1909

Lectures resumed.....Monday, January 4
Commencement .....Tuesday, May 18

PRELIMINARY EXAMINATION—The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the High School Department, University State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, September 23-26, 1908.

MID-WINTER WRITTEN EXAMINATIONS in all the departments are held before the Christmas vacation. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy**—three lectures; six hours osteology and dissection. 2. **Inorganic Chemistry**—two and a half lectures; four

hours laboratory; one recitation. 3. **Organic Chemistry**—two lectures; one recitation. 4. **Physiology**—two lectures; one recitation; two hours demonstration. 5. **Hygiene**—one lecture. 6. **Histology**—five hours laboratory; one recitation. 7. **Materia Medica**—three lectures; two recitations.

Lectures 13½; laboratory 9 hours; dissection and demonstrations 8 hours; recitations 6.

Second Year

1. **Anatomy**—two lectures; seven hours dissection and demonstration; two recitations. 2. **Anatomy and Pathology of Nervous System**—one lecture; two and a half hours laboratory. 3. **Organic and Physiological Chemistry and Toxicology**—one and a half lectures; three hours laboratory; one recitation. 4. **Physiology**—one lecture; two and a half hours laboratory; one and a half recitations. 5. **Therapeutics**—one lecture; one-half recitation. 6. **Theory and Practice**—two lectures; one-half recitation. 7. **Surgery**—two demonstrations. 8. **Bacteriology and Pathology**—eight hours laboratory.

Lectures 8½; dissections and demonstrations 9 hours; laboratory 16 hours; recitations 4½.

Third Year

1. **Theory and Practice**—four lectures; two recitations; one hour clinics. 2. **Clinical Microscopy**—two and a half hours laboratory. 3. **Therapeutics**—two lectures; one recitation half the term. 4. **Electro-therapeutics**—one lecture half the term. 5. **Obstetrics and Gynecology**—three lectures. 6. **Pediatrics**—one lecture; one recitation half the term. 7. **Neurology**—one lecture; one recitation; one clinic. 8. **Surgery (pathology, operative, fractures, dislocations)**—five lectures; two and a half hours laboratory; two recitations three hours clinics. 9. **Physical Diagnosis and Ophthalmology**—section work, two hours. 10. **Medical Jurisprudence**—one lecture half the term. 11. **X Rays**—one demonstration half the term. 12. **Obstetrical Histology and Pathology**—

two and a half hours laboratory. 13. **History of Medicine**—one lecture half the term.

Lectures 17½; laboratory 7½ hours; demonstrations ½ hour; recitation 6; section work 2; clinics 5.

Fourth Year

1. **Theory and Practice**—three lectures; one recitation; two and a half hours clinics. 2. **Neurology**—one lecture; one clinic. 3. **Gynecology**—one lecture half the term. 4. **Obstetrics**—two and a half lectures; one recitation. 5. **Surgery (including Orthopedics)**—four lectures; one recitation; three hours clinics. 6. **Specialties**—one recitation. 7. **Conferences**—one medical; one surgical. 8. **Clinical section work**—sixteen hours.

Lectures 11; recitations 4; conferences 2; clinics 6½; clinical section work 16 hours.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application to the Registrar.

Laboratories

Practical Chemistry. The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded, since although some knowledge of chemistry is highly desirable none is now required at entrance, by a series of lessons upon chemical nomenclature, notation and the essential principles of theoretical chemistry, including the laws of combination and valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids ,which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboards, discussed by the class, and entered upon their notes.

Physiological Chemistry. Laboratory work in this subject consists in the isolation, preparation and identification by tests, of the various important proteids, fats and carbohydrates. The composition of the tissues and organs is next studied with special reference to their most important constituents; the chemistry of digestion, secretion and excretion then receives attention in relation to the several physiological process involved. Finally there follows a thorough course in qualitative and quantitative urine analysis. The student is required to make careful and thorough notes of the actual experiments performed and also of the deductions to be drawn from them. The practical work is interspersed with lectures and recitations.

Histology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on Lake Avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender, of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Bacteriology. The work consists of lectures followed by practical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies, and material from autopsies and surgical operations is demonstrated to them as available. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, fæces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

In all these courses the student is taught independent methods of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for physicians in the vicinity, this laboratory offers excellent facilities for the examination of urine, sputum, pathological specimens and blood. Information regarding such examinations may be obtained by communicating with Dr. S. Burt Wolbach, Director.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sections of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work especial attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to

the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, dermatology, neurology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, operative obstetrics, electrotherapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and are as follows:

First Year

Matriculation	$5 00	
Lecture Course	100 00	
Chemical Laboratory	10 00	
Histological Laboratory	10 00	
Dissection (including material)	5 00	
		$130 00

Second Year

Matriculation	$5 00	
Dissection (including material)	10 00	
Lecture Course	100 00	
Bacteriological and Pathological Laboratory	15 00	
Physiological Chemistry and Experimental Physiology	15 00	
		145 00

Third Year

Matriculation	$5 00	
Lecture Course	100 00	
Clinical Microscopy, Surgical and Obstetrical Pathology	15 00	
		120 00

Fourth Year

Matriculation	$5 00	
Lecture Course	100 00	
Final Examination	25 00	
		$130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session. There is also a fee of five dollars paid by members of the fourth year class to the Guild for the Care of the Sick for the course in practical obstetrics.

The payment of three hundred dollars in advance entitles to attendance upon four courses of lectures, exclusive of laboratory and other special fees above stated, and effects a saving of one hundred dollars on the cost of the four year course, *but this ticket must be taken out within thirty days from date of matriculation.* All other fees are payable strictly in advance except that the final examination fee may be paid at any time before the examinations begin. Graduates of the school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. The janitor of the college keeps a list of boarding houses at which good rooms and board can be obtained at from four to five dollars a week or upwards, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses since these of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other recognized medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in "Examination Departments," as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under "Examination Rules." No credit will be given for work done elsewhere in fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

Willis G. Tucker, M. D., *Registrar*
Albany, New York

ALBANY LAW SCHOOL

ALBANY, NEW YORK

LAW DEPARTMENT

UNION UNIVERSITY

ALBANY LAW SCHOOL

This School is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. The school is and has been largely represented in the Executive, Judicial and Legislative departments of this and many other States, as well as of the federal government.

It became a part of Union University in 1873, and begins its fifty-ninth year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading States in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other Law School in the State for observing the methods and procedure collectively of the executive, judicial and legislative departments of the State governmment. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated.

It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it is not so large as to make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed.

Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the State Law Library, the most extensive and best selected in the United States, consisting of 65,000 volumes or more.

With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

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Special Lecturers. The list of special lecturers is a notable one, including the former Chief Judge and two Associate Judges of the Court of Appeals, a Justice of the Supreme Court and a former Supreme Court Justice.

Hubbard Chair of Legal Ethics. The circulars of seventy of the leading Law Schools of the country show that only twenty of this number make the subject of Legal Ethics part of their curriculum. With two exceptions, those schools are either in the West or South. These facts led Gen. Thomas H. Hubbard, class of '60, to place at the disposal of the Board of Trustees the sum of $10,000, the income to be applied to lectures upon this subject. The Board of Trustees decided to inaugurate the course at the opening of the school year of 1903. Gen. Hubbard, the founder of the chair, delivered the opening lecture, and will be followed during the academic year 1908-9 by Judge William E. Werner of the Court of Appeals, Hon. Alton B. Parker, late Chief Judge of that Court, and others.

CALENDAR

First Semester

1908

September 22.	Registration of students.
	Tuition due.
September 23.	Scholastic year begins.
November 3.	Election day. Recess one day.
November 25.	(Noon.) Thanksgiving vacation begins.
December 1.	Lectures resumed.
December 24.	(Noon.) Holiday vacation begins.

1909

January 6.	Lectures resumed.
January 29.	McKinley Day.
February 4, 5.	Examinations.

Second Semester

February 8.	Semester begins.
	Registration of students.
	Tuition due.
February 22.	Washington's Birthday. Recess one day.
April 9.	Good Friday. Recess one day.
May 30.	Decoration Day. Recess one day.
June 3–4.	Examinations.
June 9.	Commencement.

ADMISSION AND GRADUATION

Admission to Junior class. The full course of study consists of two scholastic years, divided into two semesters each. Any student who has conformed to the requirements of the Regents as to general education after commencing the study of law, may enter the Junior class, and upon completion of the two years' course and passing the required examinations will be graduated with the degree of LL. B.

College graduates will find this course well adapted to the requirements of the Court of Appeals, requiring them to study law two calendar years after graduation. They can enter the school upon presentation of their certificate of graduation, without examination, attend the full course of two years, of not less than eight months each, receive the degree of LL. B., and take the bar examination in June following their graduaation from the school.

Admission to Senior class. Any student not a college graduate who has completed two years of required legal study, after conforming to the requirements of the Regents as to general education, or any college graduate who has completed one year of such study after graduation, will be admitted to the Senior class without examination upon production of the Regents' certificates and certificate of Clerk of Court of Appeals, and will be admitted to the privileges of the class but will not be received as a candidate for a degree.

Students who have attended a law school and satisfactorily completed the work of the Junior year will be allowed to enter as candidates for a Degree in the discretion of the Faculty.

Degree. The degree of LL. B. will be conferred only upon students who have completed the entire course of two years at a law school.

EXPENSES

The fees for tuition are payable in advance as follows: For the full course of one year, tuition, $110; matriculation fee, $10; fee for certificate of attendance, diploma and expenses attendant upon commencement, $10, or $65 for the first semester and $65 for the second. For the full course of two years upon conferring degree of LL. B., tuition, $220, $10 matriculation fee, fee for certificate of attendance, diploma and expenses attendant upon commencement, $10, or $65 for the first semester and $55 for each semester thereafter, except the last, which will be $65.

For catalogues or further information address

JNO. J. HUGHES, *Secretary*
Albany Law School
Albany, New York

DUDLEY OBSERVATORY

ALBANY, NEW YORK

DEPARTMENT OF ASTRONOMICAL RESEARCH

UNION UNIVERSITY

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THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake Avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of Albany. It is devoted to original researches in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of "Annals," and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at the present time is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole. The staff consists of the director, nine assistants and seven computers.

The instrumental equipment of the Observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn Equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott Meridian Circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory.

In addition to these instruments, the Observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W.

Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution.

Since 1902, annual grants have been made to the Director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie Institution made special provision for carrying on the star researches upon which the Observatory is engaged for a period of ten years. This includes an appropriation which enables the Observatory to send the Olcott Meridian Circle to the Southern Hemisphere for several years with an ample force of observers, in order to carry out an essential feature of its investigations. The Southern Observatory is now under process of construction and will be in operation early in 1909.

The Dudley Observatory is not designed to give general instruction in Astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the Observatory.

The Observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

For further particulars apply to

Lewis Boss
Director

ALBANY COLLEGE OF PHARMACY

ALBANY, NEW YORK

DEPARTMENT OF PHARMACY

UNION UNIVERSITY

ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the Board of Governors of Union University, June 21, 1881, and constitutes the **Department of Pharmacy of Union University.** It was incorporated as the "Albany College of Pharmacy" August 27, 1881.

The exercises of the college are held in the Albany Medical College building on Eagle street, distant but a block from the Capitol, and in the pharmaceutical laboratory on Maiden Lane. The lecture rooms and laboratories are well adapted to the needs of the college and furnish to the faculty excellent facilities for imparting instruction. The lectures are delivered in the chemical lecture room on the first floor, adjoining which is the large and well-fitted chemical laboratory where instruction is given to the classes in practical chemistry. The collections in the different departments are very complete and afford the instructors ample facilities for the illustration of the lectures.

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WILLIS G. TUCKER
ARTHUR L. ANDREWS
OTTO SCHOLZ
SAMUEL B. WARD
EDWARD N. McKINNEY
CHARLES GIBSON

FACULTY

GEORGE ALEXANDER, D. D.
Chancellor ad interim of the University

WILLIS GAYLORD TUCKER, M. D., PH. D., Dean
Professor of Chemistry and Toxicology

ALFRED BIRCH HUESTED, M. D., PH. G.
Professor of Botany, Materia Medica and Physiology

GUSTAVUS MICHAELIS, PH. G.
Emeritus Professor of Pharmacy

THEODORE JAMES BRADLEY, B. S., PH. G., Secretary
Adjunct Professor of Inorganic Chemistry and Mathematics

GARRET VANDER VEER DILLENBACK, PH. G.
Associate Professor of Pharmacy

EDWIN CUNNINGHAM HUTMAN, PH. G.
Director of Pharmaceutical Laboratory

JAMES EMMETT HUESTED
Instructor in Materia Medica

WILLIAM ATWOOD LARKIN, PH. G.
Instructor in Physics and Organic Chemistry

SPENCER LYMAN DAWES, M. D.
Instructor in Microscopy and Pharmacognosy

JARED WATERBURY SCUDDER, A. M.
Instructor in Latin

CALENDAR FOR 1908-1909

1908

Introductory lecture, Monday, October 5.
Election vacation, Monday and Tuesday, November 2 and 3.
Thanksgiving vacation begins Wednesday, November 25.
Lectures resumed Monday, November 30.
Christmas vacation begins Monday, December 21.

1909

Lectures resumed Monday, January 4.
Commencement Tuesday, April 12.

ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age and will be required to present a PHARMACY STUDENT CERTIFICATE issued by the New York State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, N. Y.

THE CURRICULUM

of the college embraces:

Chemistry—Theoretical, General, Pharmaceutical and Analytical

Botany—Structural, Systematic and Analytical

Materia Medica and Pharmacognosy

Pharmacy—Theoretical and practical

Microscopy—Theoretical and practical in its relations to Pharmacy

Pharmaceutical Mathematics

Physics

Physiology

Latin

REQUIREMENTS FOR GRADUATION

The diploma of this college confers the degree of GRADUATE IN PHARMACY (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR

Matriculation	$5 00
Tuition	75 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

THEODORE J. BRADLEY, PH. G., *Secretary*
4 Lancaster street
Albany, New York

CATALOGUE OF STUDENTS

1908-1909

UNION UNIVERSITY

ATTENDANCE, UNION UNIVERSITY, 1908-09

Students of Union College

Abbreviations

c, A. B. course; *ls*, Ph. B. course; *s*, B. S. course; *e*, B. E. course in General Engineering; *se*, B. E. course in Sanitary Engineering *ee*, B. E. course in Electrical Engineering; *els*, B. E. General Engineering and Ph. B. six year course; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

Candidates for the Degree of Master of Arts

Henry Winne Bell.....*Albany*
Leslie Nathan Broughton, A. B.....*Victor*
Samuel B. Howe, Jr., A. B.....*Plainfield, N. J.*
Floyd Leslie Miller, Ph. B.....*Batavia*
George LeRoy Shelley, A. B.....*Mercersburg, Pa.*
Charles N. Waldron, B. S.....*Buffalo*
Mark S. Watson, A. B.....*Plattsburg*

Candidate for the Degree of Master of Science

Raymond S. Bennett, Ph. B.....*Schenevus*

Graduate Students

Cassius Miles Davis.....*Detroit, Mich*....32 Wendell Ave.
Candidate for the degree of Master of Electrical Engineering.

Olin J. Ferguson.....*Schenectady*..244 Parkwood Blvd.
Candidate for the degree of Master of Electrical Engineering.

Oscar von Voightlander.....*Schenectady*.....317½ Seward Pl.
Candidate for the degree of Master of Civil Engineering.

Daniel A. Young.....*Schenectady*..... 320 Lenox Road
Candidate for the degree of Master of Civil Engineering.

Seniors, Class of 1909

e	Floyd Elmer Allen	*Elmira*	M. S. N. C.
ls	Samuel A. Baillie	*Troy*....223 4th St.,	Troy, N. Y.
e	William Waldo Brown	*Brooklyn*	Ψ ϒ House
ee	Robert L. Brunet	*Petersburg, Va.*	Σ Φ Place
e	Clarence E. Burleigh	*Plattsburg*	S. S. N. C.
e	Francis William Burleigh	*Plattsburg*	S. S. N. C.
ls	James Bradin Chapman	*Broadalbin*	Δ Φ House
s	Francis Temple Chase	*Utica*	Δ Φ House
s	Adelbert Garry Clark	*Elmira*	Ψ ϒ House
ee	R. Philip Clark	*Kingston*	Φ Γ Δ House
s	Winfred MacBain Corbin	*Binghamton*	Σ Φ Place
ls	C. Roscoe Failing	*Palatine Bridge*	M. S. S. C.
s	John William Faust	*Schenectady*	19 Jay St.
e	Raymond J. Finch	*Alpine*	M. S. N. C.
ee	Leon Burhaus Foote	*Whitehall*	Φ Γ Δ House
s	Doane Sinclair Guardenier	*East Springfield*	Φ Δ Θ House
s	Harry D. Hanford	*Unadilla*	S. S. S. C.
e	Edward Everett Harkness	*Harkness*	M. S. N. C.
ee	Stephen Howland	*Berlin, Germany*	N. S. N. C.
e	Raymond M. Jolley	*South Bethlehem*	Δ Φ House
e	Emil Kiessling	*New York City*	N. S. N. C.
e	Henry Edward Lewis	*Ballston Spa*	Ψ ϒ House
c	Roy Hamilton McCormack	*Delmar*	S. S. S. C.
e	John Joseph McCormick, Jr	*Troy*	Δ ϒ House
ee	Cromwell McIntosh	*Buffalo*	K A Lodge
m	Ward Winthrop Millias	*Castleton*	Alb. Med. Coll.
c	Elmer Wallace K. Mould	*Green Island*	8 Eagle St.

ee Shiv Narayan.....*India*.....205 Union St.
e J. Elliott Parry.....*Glens Falls*.....K A Lodge
s Jonathan Pearson.....*Hudson*.....Σ Φ Place
ee Leo H. Perry.....*Herkimer*.....Φ Γ Δ House
e Fred Wilbur Pettit.....*Brockport*.....Φ Δ Θ House
ee Cedric Potter.....*Omaha, Neb*.....X Ψ Lodge
s Chester Leland Rankin.....*Schenectady*.....1202 State St.
e Edwin Hazelett Robinson.....*Watervliet*.1512 3rd Ave., Water't
e George W. Roosa.....*Buffalo*.....Δ Υ House
e Harry A. Schaupp.....*Albany*.....Ψ Υ House
e Herbert Davis Schutt.....*Schenectady*..148 Glenwood Blvd.
ee Pierre J. Simkins.....*Amsterdam*.....Φ Γ Δ House
ee Harold Ernest Starbuck.....*Gouverneur*.....B Θ Π House
ee Arthur J. Streibert.....*Albany*.....Δ Υ House
ee Ralph Henry Tapscott.....*Brooklyn*.....A Δ Φ House
ls Alvin Ury.....*Schenectady*.....143½ Barrett St.
ls Ralph J. Ury.....*Schenectady*.....143½ Barrett St.
c Carl Wachter.....*Green Island*....216 McClellan St.
s Otto Jean Walrath.....*Gloversville*.....S. S. S. C.
e J. Leslie Walton.....*Schenectady*.....1234 Union St.
c James Bell Welles.....*Geneseo*.....Δ Φ House
s Ernest Macmillan Wilson.....*Hebron*.....N. S. N. C.

Seniors—49

Juniors, Class 1910

s William A. Ackroyd.....*Albany*.....Φ Γ Δ House
e William Joseph Anderson.....*Glens Falls*.....N. S. N. C.
ls Roland Miller Bartlett.....*Glendale, Mass*.....N. S. N. C.
e Walter J. Becker.....*Altamont*.....147 Nott Terrace

e Raymond S. Bennett.....*Schenevus*.....N. S. N. C.
e John Hammond Bovier.....*Elmira*.....M. S. N. C.
s Perley Henry Buck.....*Schenectady*....11 No. College St.
s Albert Edward Carmichael.....*Schenectady*.....201 Union St.
c Samuel McCrea Cavert.....*Schenectady*.....29 Furman St.
ls William Lane Cavert.....*Schenectady*.....29 Furman St.
c Arthur Russell Chaffee.....*Morristown*.....513 Smith St.
ee John G. Charest.....*Schenectady*.....12 Barrett St.
s Harry Gabriel Coplon.....*Troy*.....563 So. Centre St.
ee Archibald R. Dennis.....*Kalamazoo, Mich*....Δ Δ Φ House
ee George A. Dillinger.....*Nuernberg, Germany*..M. S. N. C.
s Raymond C. Dillingham.....*Denver, Colo*.....X Ψ Lodge
e Harley Dunbar.....*Gloversville*.....Δ Φ House
s William Ferguson.....*Oneida*.....Ψ ϒ House
ee Harlan Haviland Grover.....*Glens Falls*.....Δ ϒ House
ls Johnson Potter Hallenbeck....*Hoffmans*..... Φ Γ Δ House
ee Macy Orsen Hallock.....*Rochester*.....B Θ Π House
e Seward Daniel Hendricks.....*Sodus*.....Φ Δ Θ House
e Louis Albert Hequembourg....*Schenectady*.....22 Gillespie St.
e Adam John Horn.....*St. Johnsville*.....M. S. N. C.
s J. Mason Hotchkiss.....*Schenectady*.....70 Union Ave.
s Horace King Hutchens.....*Pulaski*.....Δ Δ Φ House
ee Strickland K. Hyde.....*Hackensack, N. J*....Δ Δ Φ Housə
ls Edward B. Irish.....*Schenectady*....113 Campbell Ave.
ee Stephen Dunn Kelley.....*Saratoga Springs*....B Θ Π House
ee Andrew Vincent Kelly.....*Albany*.....N. S. N. C.
ee Arnold Edward Kriegsmann ...*Schenectady*.....27 Wendell Ave.
s William H. Ladue.....*Plattsburg*.....B Θ Π House

e	Harry MacConnell Leon	*Little Falls*	Ψ ϒ House
e	Eben Joseph Long	*Youngs*	South Colonnade
s	Howard C. Macomber	*Delanson*	Delanson
e	John J. McManus	*Albany*	N. S. N. C.
s	Charles Lawrence Mead	*S. Ste. Marie, Mich.*	Α Δ Φ House
e	Ralph Stetson Merrill	*Gloversville*	Δ Φ House
e	Chester Moore	*Horseheads*	North Colonnade
ee	William B. Neilson, Jr.	*Mechanicville*	Δ Φ House
c	Roscoe Almond Paul	*Richmondville*	424 Liberty St.
ee	William Edward Paul	*Richmondville*	424 Liberty St.
s	Arthur Cuthbert Potter	*Omaha, Neb.*	X Ψ Lodge
ee	Edward Delavan Ransom	*Albany*	Α Δ Φ House
ee	Lloyd Nash Robinson	*Lockport*	Δ ϒ House
e	Harold E. Scheper	*Beaufort, S. C*	M. S. N. C.
ee	Harold E. Seamans	*Marathon*	Φ Δ Θ House
ee	Richard Parsons Sears	*Buffalo*	Α Δ Φ House
ee	Raymond Seem	*Elmira*	783 Nott St.
ee	Robert Blanchard Shepard	*Hudson*	Α Δ Φ House
ee	Aaron H. Sherman	*Albany*	N. S. N. C.
e	Philip Foster Shutler	*Utica*	Φ Δ Θ House
ee	Newton Waldron Slutter	*West Seneca*	Σ Φ Place
e	Carson Edwards Smith	*Herkimer*	Ψ ϒ House
e	Burr Marlow Stark	*Gloversville*	Silliman Hall
s	Henry P. Stewart	*Bath*	X Ψ Lodge
ee	Paulo Floriano de Toledo	*San Paulo, Brazil.*	14 Barrett St.
c	Harry G. Van Deusen	*Cooperstown*	Φ Δ Θ House
s	Horace E. Vedder	*Schenectady*	X Ψ Lodge
c	Theodore Demarest Walser	*Cohoes*	Α Δ Φ House

e Edmund Brown Whitcomb....*Holyoke, Mass*...124 Lafayette St.
ee Peter J. Whitmore.....*W. Coxsackie*...147 Nott Terrace
e William DeWitt Zielley.....*Avoca*.....M. S. N. C.
e Judson Zimmer.....*Gloversville*..... ..Δ Φ House
e Harry Burton Furnside.....*Schenectady*.....Β Θ Π House

Juniors—65

Sophomores, Class of 1911

e Anderson Allyn.....*Holyoke, Mass*.....Δ Υ House
e Charles Gorsch Atkin.....*East Orange, N. J*....Β Θ Π House
e George Bean Baker.....*Yonkers*.....783 Nott St.
e Harold Wallace Baker.....*Oneida*.....Ψ Υ House
e Joseph Albert Barros.....*San Paulo, Brazil*.....M. S. S. C.
c John Beakley.....*Johnstown*.....Δ Φ House.
e Louis Ray Bennett.....*Howard*.....M. S. N. C.
e Laurence William Bentley.....*Elmira*.....783 Nott St.
e Thomas James Berry.....*Elmira*.....Ψ Υ House
ls Harold Eugene Blodgett.....*Schenectady*....168½ Lafayette St.
e Franklin J. Bowman.....*St. Johnsville*.....Δ Υ House
e Edward Henry Branson.....*Coatesville, Pa*.....Φ Γ Δ House
c Michael William Bray.....*Churubusco*.....N. S. N. C.
e Arthur Doran Brown.....*Ogdensburg*.....Α Δ Φ House
e Herman Fred W. Brumm.....*Tonawanda*.....M. S. N. C.
e Charles Milton Canfield.....*East Orange, N. J*....Β Θ Π House
c Walter Dudley Cavert.....*Schenectady*.....29 Furman St.
ls Garrett Marcellus Clowe.....*Schenectady*.....613 Union St.
c Tristam Coffin.....*Hudson*.....Κ Α Lodge
ls Harry Arthur Cohen.....*Schenectady*.....119 State St.

e	Earl K. Dewey	*Adams*	M. S. N. C.
e	Walter R. H. Dick	*Schenectady*	1 Avenue B
e	Charles F. Duchscherer	*Buffalo*	S. S. N. C.
s	T. Gillespie Dunn	*Hadley*	Φ Δ Θ House
ls	Otto Alois Faust	*Schenectady*	19 Jay St.
e	Eugene D. Fink	*Schenectady*	33 Wendell Ave.
e	George Merchant Fowler	*Buffalo*	Δ Υ House
e	Harold Jesse Goodman	*Albion*	N. S. N. C.
s	Bernard A. Gray	*Black River*	N. S. N. C.
c	Leo Augustine Hanigan	*Schenectady*	938 State St.
c	Daniel J. Hawkins	*Elmira*	S. S. N. C.
e	Everett Keeler Hawley	*Hartford, Conn*	X Ψ Lodge
e	Burton Houk	*Owego*	Β Θ Π House
e	Bert Martin Hubbard	*Greenwich*	204 Hulett St.
e	Charles Sheldon Hubbard	*Bay Shore L. I*	Κ Α Lodge
e	John S. Hunter	*Willimantic, Conn*	Φ Δ Θ House
e	Gustave Huthsteiner	*Schenectady*	120 Park Ave.
s	Hans Huthsteiner	*Schenectady*	120 Park Ave.
e	Neil Dutton Hyde	*Afton*	S. S. S. C.
e	Theodore Schuyler Ingham	*Little Falls*	Σ Φ Place
s	Henry Berger Keckeley	*Charleston, S. C*	Σ Φ Place
e	Willis C. Lincoln	*Schenectady*	606 Hamilton St.
ls	Charles Frederick MacGill, Jr	*Pittsfield, Mass*	Α Δ Φ House
e	Manly Leonard Mackey	*Cobleskill*	32 Furman St.
c	Arthur Lyman Maxon	*Schenectady*	118 Park Ave.
e	Rufus B. McConnell	*Buffalo*	Δ Υ House
e	Randal John McCullough	*Chazy*	S. S. N. C.
c	Ransom Rathbone Micks	*Seneca Falls*	Α Δ Φ House

c	Stanley Congdon Miller	*Elmira*	X Ψ Lodge
ls	Charles Inslee Mohair	*Newton, N. J.*	North College
e	Harold Wheeler Morss	*Albany*	K A Lodge
ls	Edward J. O'Connell	*Albany*	S. S. S. C.
s	John Bancroft Odell	*Schenectady*	49 Parkwood Blvd.
s	Frank Sidney Ostrander	*Schenectady*	Σ. Φ Place
e	Allen Adams Patterson	*Glens Falls*	M. S. N. C.
s	Leo B. Pearsall	*Sodus*	Δ Υ House
e	Gilberto Ratto	*San Paulo, Brazil*	529 Liberty St.
s	Harry S. Reynolds	*Schenectady*	12 Gillespie St.
e	Edgar John Simmons	*Glens Falls*	K A Lodge
e	Walter Curtis Smith	*Lynchburg, Va*	N. S. N. C.
e	Howard Olwin Thorne	*Yonkers*	X Ψ Lodge
e	Ralph Hayford Tiebout, Jr	*Brooklyn*	A Δ Φ House
e	John Archie Hyde Torry	*Cooperstown*	Σ Φ Place
e	S. Vernon Travis	*Hale Eddy*	S. S. S. C.
e	Jacob H. Van Aernam	*Altamont*	Φ Δ Θ House
e	Fremont L. VanPatten	*Duanesburg*	Duanesburg
s	Arthur Henry Vines	*Holyoke, Mass*	M. S. N. C.
e	Chester M. Wallace	*Clinton*	Φ Δ Θ House
e	George B. Weaver	*Loudonville*	Δ Υ House
e	Henry Edward Whiteside	*South Cambridge*	Φ Δ Θ House
e	Fred Babcock Wilbur	*Adams*	M. S. N. C.
e	Charles Leland Wood	*Herkimer*	Φ Γ Δ House
e	John Smith Woodward	*Warrensburg*	Δ Φ House
e	Frank Wallace Yates	*Fort Edward*	750 Nott St.

Sophomores—74

Freshmen, Class 1912

e Carl Entricans Anderson ..... *Albany* ..... Δ ϒ House
e Garfield V. R. Arthur ..... *Keeseville* ..... 107 Avenue B.
e Lawrence Lester Badger ..... *Ellenburgh Depot.* 633 Terrace Pl.
e Harry Randal Ballou ..... *Rutland, Vt.* 163½ Nott Terrace
ls Chatfield Terry Bates ..... *Schenectady.* 143 Lafayette St.
e William Maser Beck ..... *Buffalo* ..... 783 Nott St.
ls Frederick S. de Beer ..... *Johnstown* ..... 783 Nott St.
e Leon Le Roy Biche ..... *Black River* ..... M. S. N. C.
e Jesse Chester Blair ..... *San Francisco, Cal.* . S. S. N. C.
ls Isadore Bookstein ..... *Albany.* 61 So. Ferry St., Albany
e Madison Edward Brainerd ..... *Albany* ..... K A Lodge
s Edgar Zeh Briggs ..... *Schenectady* ... 29 Wendell Ave.
e Frank Colligan Buckley ..... *Plattsburg* ..... S. S. N. C.
c Blaine Raymond Butler ..... *Johnstown* ..... Δ Φ House
e Russell Church Campbell ..... *Niagara Falls* ..... Δ Φ House
e Howard Tyler Case ..... *Hartford, Conn.* 49 Wash'ton Ave
e George Raymond Chapman ..... *Broadalbin* ..... Δ Φ House
e Leslie Kellogg Chapman ..... *Auburn* ..... S. S. N. C.
e Lawrence Sprague Churchill ..... *Oswego* ..... Σ Φ Place
e Francis James Clancy ..... *Elmira* ..... S. S. N. C.
e John Graham Clarke ..... *Bogota, N. J.* ..... A Δ Φ House
e Ralph de Pomerait Clarke ..... *Schenectady* ..... 1106 Nott St.
e Bingley Marcus Collins ..... *Bainbridge* ..... 783 Nott St.
e Howard Elisha Cook ..... *Franklin* .... 163½ Nott Terrace
e Harry Francis Coward ..... *Buffalo* ..... A Δ Φ House
e William Wallis Coykendall ..... *Elmira* ..... Ψ ϒ House

e Louis Henry De Long.....*Hoosic Falls*.....783 Nott St.
e Robert Earle Dennis.....*Kalamazoo, Mich.* Α Δ Φ House
e Earl Devendorf.....*Schenectady*....1228 State St.
ls Norman McLeod Dingman.....*Spring Valley*.....Φ Γ Δ
s Frank Dudley.....*Exeter, H. N.*212 Glenwood Blvd
ls James Manning Dunn.....*Schenectady*...340 Summit Ave.
e Walter Shelton Easterly.....*Gloversville*.....N. S. N. C.
s Thomas Stanley Amos Fairbairn.*Buffalo*.....Α Δ Φ House
e Paul Fasoli.....*Glens Falls*....108 Park Place
e John Lyric Fisher.....*Buffalo*.....Α Δ Φ House
s Charles H. Ford.....*Schenectady*.....779 State St.
e Daniel Scott Fox.....*Prattsburg*.....M. S. S. C.
e Robert Carlyle Gillies.....*Medina*.....29 Furman St.
e Thomas Michael Gray.....*Tuxedo Park*..108 Park Place
e James Harry Griffin.....*Fort Edward*.....750 Nott St.
e Irving Forrest Hand.....*Binghamton*.....Δ Υ House
e Joseph Edward Hanigan.....*Schenectady*....24 Nott Terrace
e Franklin Earl Hardy.....*Canterbury, N. H.*627 Terrace Pl
e Burdette L. Hayner.....*Troy*.....515 6th St., Troy
e Robert S. Hendryx.....*Avoca*.....M. S. S. C.
c Edward Francis Hennelly.....*Johnstown*.....704 Huron St.
s Charles Louis Hequembourg.....*Schenectady*....22 Gillespie St.
s Philip Toll Hill.....*Schenectady*....1528 Union St.
e Walter Sinn Hoyt.....*Monterey, Mass.*..Α Δ Φ House
e Roy William Hurlbut.....*Gouverneur*....106 Park Place
e Raphael Jimenez.....*Havana, Cuba*..529 Liberty St.
e Oscar Victor Johnson.....*Olean*.....N. S. N. C.

e Montgomery, Ker.....*Jersey City, N. J.*231 Seward Pl.
e Arthur Lloyd Kniffen.....*West Coxsackie*....723 Nott St.
s Myron Edward Krueger.....*Schenectady*.....R. F. D. No. 2
e Fred Whitney Ladue.....*Troy*.....723 Nott St.
ls Myer Joseph Lavin.....*Albany*...17 Clinton St., Albany
s Edward Potter Lawsing.....*Schenectady*..405 Lafayette St.
s Alexander Hallenbeck Leamon..*Schenectady*.....242 Union St.
c Victor Alexander Lord.....*Syracuse*.....147 Nott St.
e Robert Henry Lowrie.....*DeLand, Fla*.....M. S. N. C.
e John Lyons.....*Plattsburg*.Miller House, Cohoes
e Julian Lidrew MacCreary.....*Savona*.....N. S. N. C.
e James Robert MacEwan.....*Canajoharie*.....M. S. S. C.
e Edward Lawrence Mack.....*Vergennes, Vt*.....Φ Δ Θ House
s Wallace Harmon Macmillan.....*Schenectady*..209 Seward Place
ls Allan Bernard Mann.....*Schenectady*..37 Glenwood Blvd
ls Arthur Daniel Mann.....*Schenectady*.37 Glenwood Blvd.
e Walter John Mann.....*New York City*.....Δ Υ House
s Edwin J. Mapes.....*Cleveland, Ohio*.....Ψ Υ House
s Robert Paunee Marsh.....*Binghamton*.....783 Nott St.
e John Gregory Martin.....*Niagara Falls*....756 Nott St.
e Francisco M. Mattos.....*San Paulo, Brazil*..M. S. S. C.
e Robert Edwin McCloskey.....*Renovo, Pa*..449 McClellan St.
ls Edward George McCormick.....*Albany*.....Σ Φ Place
s Edward Leo McDermott.....*Schenectady*....129 Park Place
s Fred Francis McGauley.....*Schenectady*..812 Hamilton St.
e Paul Carney McQuaid.....*Webster, Mass*.108 Park Place
s John Mortimer Minuse.....*Port Chester*.....134 Front St.
e Joao Monteiro.....*San Paulo, Brazil*124 LafayetteSt

e Amos Keller Munson.....*Herkimer*.....Φ Γ Δ House
s Milton John Neubauer.....*Schenectady*.....834 State St.
e William Francis O'Loughlin.....*Schenectady*.....5 Foster Ave.
e Alden Jesse Palmer.....*South Bethlehem*..759 Nott St.
s John Alexander Palmer.....*Conklingville*....102 Beaver St.
c Morris Palmer.....*Gloversville*.....M. S. S. C.
s Orla James Park.....*Sandy Hill*.....X Ψ Lodge
c Robert Porter Patterson.....*Glens Falls*.....M. S. S. C.
e Robert Fortney Payne.....*Schenectady*..449 McClellan St.
e David B. Peckham.....*Bainbridge*....147 Nott Terrace
s Roy Webber Peters.....*Schenectady*.51 Washington Ave.
c Stanislaus Pietraszewski.....*Schenectady*..230½ So. Ferry St.
c James Henry Potter.....*Amsterdam*....110 Park Place
c John Edward Hall Randerson....*Albany*.....Α Δ Φ House
e William Allan Rice.....*Parksville*.....783 Nott St.
e James Edwin Riley.....*Elmira*.....Ψ Υ House
ls Leonard W. Ripton.....*Johnstown*.....Δ Φ House
s Thomas Rogers.....*Sandy Hill*.....X Ψ Lodge
e Alexander Hamilton Robertson, Jr*Brooklyn*.....Δ Υ House
e William Clay Ruland.....*Jefferson*.....513 Smith St.
e Fritz Kilian Ruprecht.....*New York City*.....Σ Φ Place
s Harry Roseboom Sawyer.....*Cherry Valley*.....X Ψ Lodge
c Henry Austen Schermerhorn.....*Schenectady*....121 Park Place
e Edgar Newton Scott.....*Schenectady*..513 Summit Ave.
s Arthur Wright Schuyler.....*Amsterdam*....518 Becker St.
e Frank Cady Sellnow.....*Albany*.....K A House
e Joseph Bernard Shaw.....*Auburn*.....S. S. N. C.
e John Joseph Shea, Jr.....*Albany*.53 Westerlo St., Albany

c Raymond Dalton Shepard.....*Hudson*.....A Δ Φ House
e John Stickney Shepherd.....*Saratoga Spa*.... Saratoga, Spa.
e Claude Edward Shill.....*Avoca*.....M. S. N. C.
e Fred Arthur Slade.....*Buffalo*.....K A Lodge
s Daniel Glen Smith.....*Schenectady*.53 Washington Ave.
e Howard Senica Smith.....*Gouverneur*.....B Θ Π House
e Waterman James Smith.....*Buffalo*.....K A Lodge
e Harold Ellis Stevens.....*Schenectady*....66½ Union Ave.
e John Trowbridge St. John.....*Binghamton*.....Σ Φ Place
ls Ralph Louis Streever.....*Schenectady*.....Wormer St.
e Curtis Douglas Thomson.....*Glens Falls*.....513 Smith St.
e Martin Arthur Tobin, Jr.....*Port Henry*.....S. S. N. C.
s Alexander Winfield Trainor.....*West Leyden*.....N. S. N. C.
e Horace Niles Trumbull.....*Hartford, Conn*.....K A Lodge
e Martin Emanuel Untermeyer.....*New York City*.231 Seward Place
ls Frederick George Volz.....*Brooklyn*....115 Nott Terrace
c Kenneth Eastwood Walser.....*Cohoes*.....A Δ Φ House
e Bayard Boyd Webb.....*Fulton*.....X Ψ Lodge
c J. Dorman West.....*Spring Valley*.....Φ Γ Δ House
s Philip Raymond Westcott.....*Seneca Falls*.....A Δ Φ House
c Chauncey Holmes Winters.....*Richmondville*...6 Harvard St.
e Eben Dunham Wiswell.....*Albany*.., 271 Lark St., Albany
e Grover Allen Woodard.....*Hadley*.....315½ Seward Place

Freshmen—132

Summary of Students, Union College

Candidates for the Master's Degree	8
Graduate Students	4
Seniors	49
Juniors	65
Sophomores	74
Freshmen	132
	332
Counted twice	1
Total	331

Students of the Albany Medical College

Fourth Year Class

Edward Johnson Abbott, A. B.....Albany
Morris Bellin.....Albany
William Arthur Bing.....Castleton
Lewis Webster Burdick, B. S.....Chaseville
Craig Thomas Burns.....Geneseo
William Francis Conway.....Albany
William Henderson Davidson, A. B., Pd. B.....Cohoes
Edward Daniel Donohue.....Glens Falls
Harry Houghton Drake.....Albany
Orla Andrew Druce.....Fulton
Wakeman Clark Egerton, A. B.....Albany
Gilbert Charles Fisk.....Albany
Henry Blacklidge Gillen.....Cohoes
William Breese Gillespie.....Saranac Lake
Edwin Wallace Hannock.....Albany
Eddy Stearns Haswell.....Albany
Harley Heath .....Sandy Hill
Thomas Milton Holmes, B. S.....Albany
James Richard Hunter, M. D.....Troy
Ellis Kellert.....Albany
Charles James Kelley.....Cortland
Robert Schofield Long.....Frankford, Del.
Eugene Francis McGillian.....Green Island
James Gibbons McGillicuddy.....Glens Falls

Thomas Andrew McGrath.....Hoosick Falls
Burlin George McKillip.....Oliverea
Frederick William McSorley.....Malone
Edward Raymond Messer.....Pittsfield, Mass.
Alexander Francis Mosher.....Glens Falls
Neil Bertram Palen.....Albany
Arthur Emerson Pitts.....Cohoes
William Rufus Rathbun.....East Springfield
Clarence Leonard Russell.....Deposit
Charles Emerson Slater.....Cairo
Frederick Eugene Vaughan.....Gloversville
Walter Harry Waterbury.....East Nassau
*Arthur Ernest Were, D. O.....Albany
Calvin Bassler Witter.....Albany
James Joseph York.....Watervliet

Fourth Year Students—39

Third Year Class

William David Aldrich.....Wevertown
William Dewey Allen.....Rensselaer
Wardner Daniel Ayer.....Rensselaer
John Frederick Beiermeister.....Troy
George Bibby.....Pottersville
Claude Bledsoe.....Gloversville
Cornelius Joseph Buckley, A. B.....Pittsfield, Mass.
John Bennett Burke.....Troy
James Whitfield Byrne.....Troy

*Matriculant only

Frank Gibson Calder.....Freehold
Eugene Francis Connally.....Troy
Arthur George Cooke.....Johnstown
John Richard Devine.....Troy
George Watson Dufty.....Troy
John Arthur Farrell, Jr.....Rensselaer
Richard Berchmans Gray.....Rensselaer
Henry Martin Grogan.....Warrensburg
Philip Conrad Hacker.....Albany
James Charles Hassall.....Troy
Patrick Joseph Hirst.....Mechanicville
William Knowlton Johnson.....Schodack Landing
Walter Scott Lilienthal.....Albany
Walter Edward Lundblad.....Schenectady
Harold McDonald.....Watervliet
Edward Bartholomew Manion.....Herkimer
William Thomas Manion.....Waterford
Roy Jay Marshall.....Gouverneur
William Henry Mason.....Gloversville
John James McShane.....Springfield Center
Howard Casper Murray.....Herkimer
Charles Frederick Myers.....Saratoga
Chauncey Butler Packard.....Troy
Augustus Charles Post.....Catskill
George Bradford Randall.....Albany
Willard Tipple Rivenburgh.....Ghent
Leander George Rymph.....Ulster Park
Saul Joseph Selkin.....Albany

John Forrest Southwell.....Keene, N. H.
John Albert Sullivan.....Pittsfield, Mass.
Harold Augustus Traynor.....Brushton
Harry Franklin Van Loon.....Albany
John Edmund White.....Philmont

Third Year Students—42

Second Year Class

Martin Joseph A'Hearn.....Saratoga Springs
Antonio Martinez Alvarez.....San Juan, Porto Rico
Leroy Herbert Bender.....Utica
La Verne Adelbert Bouton.....Fultonville
Milton Gardner Burch.....North Adams, Mass.
*Sol Charles Davidson.....Rochester
Michael Ercole De Luca.....Troy
Ray Manier Eaton.....North Adams, Mass.
Percy Henry Finch.....Broadalbin
Walter Clayton Fox.....Troy
Frederick Joseph Garlick.....Fall River, Mass.
Bertram Wesley Gifford.....Masonville
Clayton Longueville Gifford.....Valley Falls
George Mills Glenn.....Auriesville
James Joseph Hart.....Rensselaer
Irwin Johnson.....Watervliet
William Neely Keith, A. B.....Newton, Pa.

*Matriculant only

Frederick Louis Kreicker.....Troy
Arthur Krida .....Schenectady
Charles Immanuel Loeble.....Troy
Harold Arthur Lucas.....Rensselaer
Thomas William Maloney.....Waterloo
Charles Edward Maxwell.....Saratoga
William Edward McCormick.....Albany
John Ashby McElwain.....Cohoes
John Thomas McGivern, Jr.....Castleton
Maurice James McGrath.....Ogdensburg
Walter Daniel McKenna.....Troy
Joseph Ambrose McPhillips.....The Glen
Horace Clifford Montgomery.....Waddington
Frank Mathias Neuendorf.....Albany
Henry Joseph Noerling.....Albany
Edmond Joseph O'Donnell.....New York
Abraham Lewis Olshansky.....Albany
Ralph Baker Post.....Catskill
Peter Francis Purcell.....Salem
Francis Bernard Quinlan.....Glens Falls
William Francis Rafferty.....Rensselaer
Hiram Burdette Riggs.....Canajoharie
Scott Booth Schleiermacher.....Bloomingburg
Emil John Senn.....Schenectady
William Thomas Shields.....Albany
William James Sweeney.....Newburg
Abraham Phineas Terk.....Glens Falls
William Trotter.....Troy

James John Walsh.....Waterloo
Arthur Eddy Wells.....Schenectady
Arthur Hastings Wheeler.....Troy
Melvin Thomas Woodhead.....Amsterdam

Second Year Students—49

First Year Class

Max Alonzo Almy.....Corning
Horace Edward Auringer.....Cohoes
Clifton Bogardus .....Catskill
John Lawrence Both.....Lawrence
Joseph Henry Bowers.....Albany
William Bertram Butts.....Albany
John Joseph Cahill.....Sandy Hill
William Henry Casey.....Troy
Joseph James Cox.....Herkimer
Rufus Baker Manley Crain.....Richfield Springs
Alton Brooks Parker Daley.....Coxsackie
Dwight Guilford Dudley.....Maine
John Lounsberry Edwards.....Randall
Louis Marcus Friedman.....Bayonne, N. J.
George Augustine Green .....Mechanicville
Paul Pattengill Gregory.....Welcome
Walter Robert Grunewald.....Gloversville
John Duncan Gulick.....Cranbury, N. J.
Vasileos Michael Koundourianes, B. A.....Albany
Royal Esterbrooks LaGrange.....East Beekmantown
Albert Lenz .....Johnstown

Norman Howe Liberty.....Ticonderoga
William Edgar Low, Jr.....Catskill
Domenico Carlantonio Mauro.....Gloversville
Joseph Edward McNulty.....Bath
Walter Leo Mercer.....Pittsfield, Mass.
Abraham Metzner .....Glens Falls
Ward Winthrop Millias.....Castleton-on-Hudson
James Henry Mitchell, Jr.....Cohoes
Floyd Hazard Moore.....Herkimer
Clarence Edmund Mullens.....Albany
Homer Hollett Oaksford.....Gloversville
Daniel Francis O'Keeffe.....Hadley
*Alva James Park.....Sandy Hill
Conrad William Perreault.....Cohoes
Daniel von Tobiase Read.....Monck's Corner, S. C.
Michael Augustine Rogers.....Schuylerville
William Henry Seward.....Amsterdam
George Aaron Sharp.....Westfield, Mass.
Charles Edward Stott.....Albany
Sterling Wallace Todd.....Hyde Park, N. J.
Floyd Alberti Weed.....Catskill
Charles Joy Wilber, Jr.....North Troy
Charles Wesley Woodell.....Delmar

First Year Students—44

*Matriculant only

Summary of Students, Albany Medical College

Fourth Year Students	39
Third Year Students	42
Second Year Students	49
First Year Students	44
Total	174

Students of the Albany Law School

Seniors

Raymond E. Aldrich.....Poughkeepsie
Caro Tracy Arnold.....Albany
James J. Barry.....Schenectady
Nicholas J. Barry, Jr.....Albany
Alexander Bills .....Chatham
Charles G. Blakeslee.....Binghamton
Roy D. Boyd .....Hoosick Falls
Marie K. Brennen.....Hudson
Cyrus M. Briggs (Union).....Schenectady
Homer D. Brockett (Colgate).....Bouckville
Charles B. Clancey .....Rochester
Robert S. Cockran.....Miami, Florida
Charles H. Coyle.....Chestertown
Jeremiah W. Davern (Fordham).....Peru
Dennis S. Dawson.....Cohoes
Charles H. Dennis.....Boonville
John T. Donlin.....Ilion
John R. Earl, Jr.....Lockport
George M. Fayles.....Troy
Wilbur D. Finch.....Alpine
James S. Flanagan.....Norwich
J. Sidney Forsyth.....Watervliet
Morris I. Franklin (American).....Albany
John M. Gauntlett, (Cornell).....Ithaca

Appleton Gregory (Williams).....Albany
William V. Haviland.....Sandy Hill
Earl Hawley .....Poughkeepsie
Richard T. Hayes.....Keesville
Dudley F. Hill, B. S. (Union).....Schenectady
Robert T. Hume (Syracuse).....Walden
William L. Hunt.....Killawog
Henry M. James.....Hudson
Alexander Johnston .....Marlboro
L. M. Kellas.....Malone
George F. Kelsey.....Olean
Raymond C. Martin.....Albany
William C. Maynard (Wesleyan).....Hartford
William M. Miller.....Schenectady
Charles S. Motisher.....Albany
Frederick Mueller .....Albany
John F. O'Brien (Manhattan).....Troy
James J. O'Bryan .....Corning
Francis O'Connor .....Wellsville
Justin V. Purcell.....Albany
John Raines, 3d.....Canandaigua
John H. Ring.....Cohoes
J. Gordon Roper (Pennsylvania).....Mishawaka, Ind.
Emmet H. Ross.....Jamestown
Frank P. Ryan.....Worcester, Mass.
José Sabater .....Mayaguez, Porto Rico
S. Louis Schnitzer.....Albany
C. Fred Schwarz.....Troy

John J. Scully.....Rensselaer
John C. Tracy (Cornell).....Hudson
Elmer J. Vincent.....Malone
Sherman C. Ward.....Rochester
Edward I. Welti.....Schenectady
Fay H. White.....Cohocton
George H. Zwick.....Albany

Seniors—59

Juniors

Dickron Agazarm (St. Louis College).....Troy
George W. Allen.....Schenectady
Charles H. Andrews.....Albany
Bertram N. Aufsesser.....Albany
Earl Barkhuff .....Altamont
F. M. Beckwith.....Glens Falls
Byron O. Brewster (Syracuse).....Lake Placid
Joseph Caplan (California).....Albany
Norman W. Cole.....New York
Arthur R. Conway.....Albany
John Conway, Jr.....Cohoes
Harold H. Corbin.....Saratoga
Edward J. Crummey (Georgetown).....Albany
Edgar A. Davies (Union).....Schenectady
J. Bernard Dougall.....Schenectady
Wyllys A. Dunham.....Saratoga
James F. Dunlavey.....Saratoga
Loye T. Durand.....Frewsburg
Leon M. Ellithrope.....Minot, N. D.

Joseph H. Engel.....Wayland
John L. Flanagan.....River Point, R. I.
Morris N. Friedland.....Albany
Walter A. Fullerton (Williams).....Saratoga
Andrew R. Gilman (Cornell).....Groveland Sta.
Howard A. Glassbrook .....Stony Creek
Leslie P. Grant.....Stamford
F. Andrew Hall.....Saratoga
Charles A. Hallock.....Danbury, Conn.
Gerald F. Harrington.....Saratoga
Thomas F. Hurley.....Warrensburg
William Hurst, Jr.....Hurstville
Duncan B. Kaye.....Troy
Worden Kelly.....Saratoga
Arthur B. King (Union).....Troy
Melvin Kinkley .....Orleans Four Corners
Stuart G. Knight.....Round Lake
Charles Lash .....Andover
William S. Lawton.....Cambridge
E. Gordon Lee.....Rochester
Charles A. McGuire, Jr.....Arctic, R. I
Walter S. McNab (Union).....Schenectady
John L. Mouringham (Mt. St. Mary's).....Arctic, R. I.
Edward Mulligan .....Scio
John F. O'Brien.....Port Gibson
E. A. Peck.....Troy
Philip M. Phelps.....Fair Haven, Vt.
Robert F. Pierce.....Albany

Leo E. Pratt.....Portland, Maine
Daniel H. Prior.....Albany
Bernard C. Race.....Cambridge
Harry L. Russell.....Glens Falls
Alexander Selkirk, ...Albany
John S. Skinner (Wisconsin).....Princeton, Ill.
John T. Sweeney, Jr.....Saratoga
S. E. Taylor.....Penn Yan
George C. Terry, Jr. (St. Lawrence).....Southold
J. Ernest Thornhill.....Wappenger Falls
Frank E. Van Olinda (Union).....Schenectady
John C. Watson.....Albany
B. A. Wickham.....Hector
Frank M. Wilcox.....Arctic

Juniors—61

Summary of Students, Albany Law School

Seniors	59
Juniors	61
Total	120

Students of the Albany College of Pharmacy

Senior Class

Gracia Naomi Anscombe.....Saratoga Springs
Michael Joseph Brennan.....Waterbury, Conn.
Anna Lucia Caldwell.....Hagaman
Charles Edgar Collins.....Johnstown
Walter Cook .....Troy
Howard James Copeland.....Glencoe, Ont.
George V. Daily.....Plattsburg
Sister John Joseph Duffy.....Troy
Edward Bernard Finn.....Sandy Hill
Daniel Cornelius Fitzgerald.....Glens Falls
Arthur Lynn Goldsmith.....Oneonta
Paul August Hespelt.....Johnstown
George Ivan Lockwood.....Penn Yan
Le Roy George Matthews.....Catskill
Walter Linn Murdock.....Flycreek
William James Murphy.....Fulton
Harry Sumner Noel.....Williamstown, Mass.
Logan Kniffen Palmatier.....Albany
Frank Smith Park.....Woodhull
James Louis Roark.....St. Johnsville
Gilbert George Roberts.....Schenectady
Elsie Emma Sautter.....Albany
Rocco Spina .....Utica

Philip Swartz ..... Albany
Raymond Ford Wasserbach ..... Albany

Seniors—25.

Junior Class

Carl Joseph Bate ..... Albany
George Washington Beers ..... Buohkill, Pa.
Leopold Branche ..... Gloversville
H. Hardin Clow ..... Coxsackie
Harold Way Cole ..... So. Shaftsbury, Vt.
Charles Thomas Eldridge ..... North Creek
Ellis William Eldridge ..... Glens Falls
Michael Giaguinto ..... Albany
Walter Marshall Hartmann ..... Schenectady
Fred Crandal Hawthorne ..... Hoosick Falls
William Henry Jacobs ..... Trout Creek
Francis Augustus Keenan ..... Albany
Guy Walter Knapp ..... Dolgeville
Philip Joseph Krank ..... Albany
Dana William Lawrence ..... Syracuse
Walter Earl Lawrence ..... Waterford
Harry Sanford Lockwood ..... Fonda
Charles George Mailloux ..... Watervliet
Charles Ignatius McCarthy ..... Pittsfield, Mass.
John Stoddard McCormick ..... Albany
Paul Alonzo Mead ..... Schenectady
Arthur John Merriman ..... Summer Hill
Charles Francis Mohan ..... Troy
George Augustin Molony ..... Schenectady

Hugh Cornelius Muldoon.....Waverly
Fenton Byron Neal.....Cherry Valley
Bernard Hawley Nelson.....Waverly
John Henry Northover.....Johnstown
Earll Bowler Port.....Gloversville
Leon Merle Randall.....Owego
Harry Eugene Robie.....Eaton
George Washington Saxe.....Catskill
Seth Earl Shanks.....Albany
Daniel J. Shea.....Hoosick Falls
William Augustus Snyder.....Mechanicville
James Herbert Spencer.....Parish
Douglas Reynolds Spiers.....Walton
Frank Genung Thompson.....Plattsburg
Thomas O'Neil Vincent.....North Clove
Irving Churchill Wiberley.....Troy
Charles Jeremiah Woodruff.....Ft. Ann

Juniors—41.

Summary of Students, College of Pharmacy

Seniors	25
Juniors	41
Total	66

Summary of Students, Union University

Union College	331
Albany Medical College	174
Albany Law School	120
Albany College of Pharmacy	66
	691
Counted twice	1
Total	690

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University Publications

Union University Quarterly

Published at the college in the interests of the several departments and their alumni

Union University Catalogue

Published annually by the college, containing University lists, complete catalogue of the college, and condensed catalogues of the other departments

Albany Law School Catalogue

Published annually by the department

Catalogue of the Albany Medical College

Published annually by the department

Catalogue of the Albany College of Pharmacy

Published annually by the department

Albany Medical Annals

Published monthly by the Medical College

The Concordiensis

Published weekly by the students of the college

The Garnet

Published annually by the Junior Class of the college

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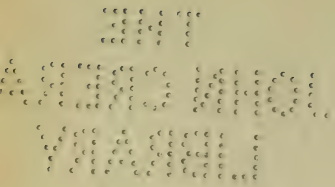

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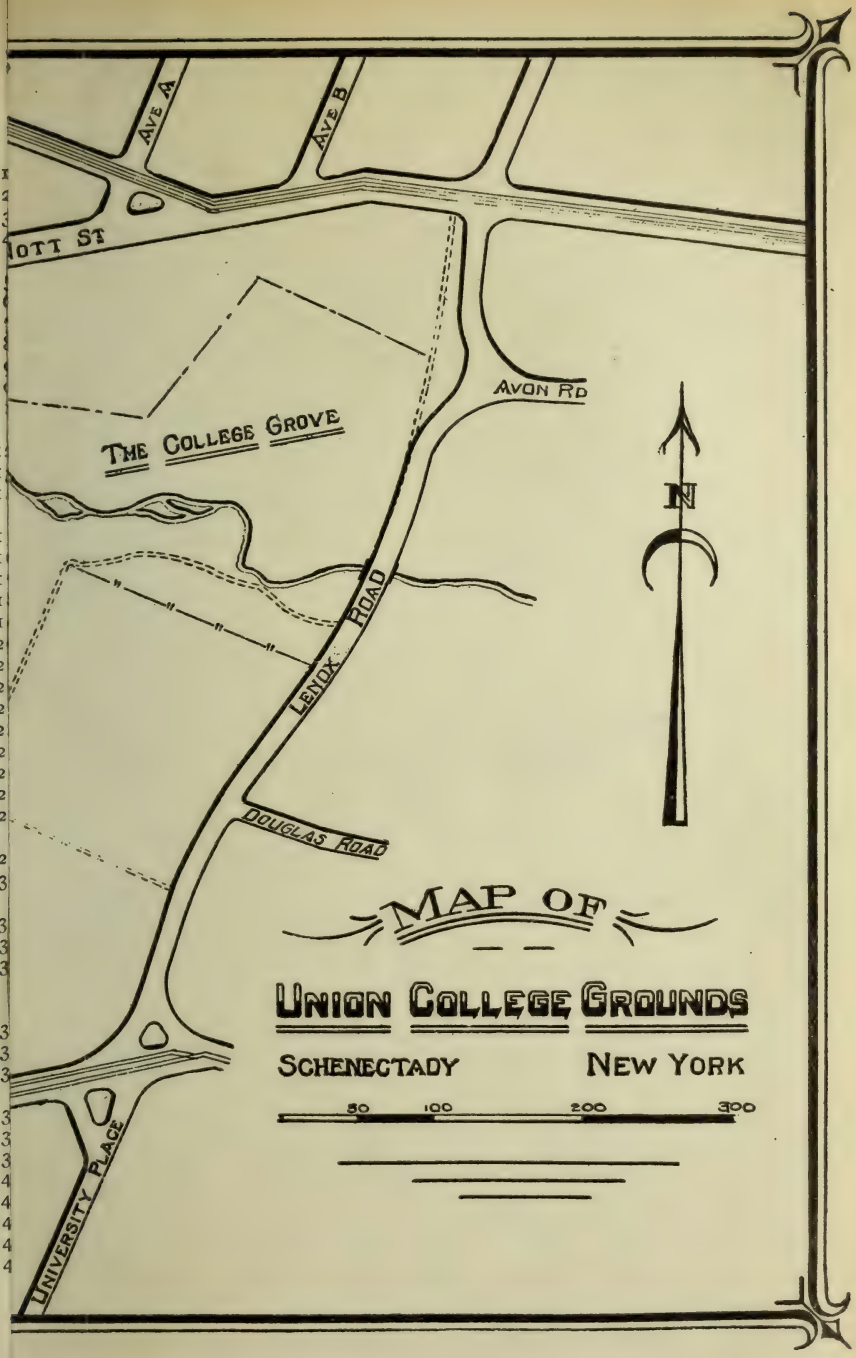
AVE A
AVE B
IOTT ST
THE COLLEGE GROVE
AVON RD
N
LENOX ROAD
DOUGLAS ROAD
MAP OF
UNION COLLEGE GROUNDS
SCHENECTADY
NEW YORK
50
100
200
300
UNIVERSITY PLACE

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5 Prof. Ellery
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7 Gymnasium
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9 Prof. Stoller
10 Prof. Hale
11 South Colonnade (classrooms)
12 Chapel
13 College Office
14 Biological Laboratory (second story);
15 $\Sigma \Phi$ Place
16 Prof. Ashmore
17 $A \Delta \Phi$ House
18 Wells House
19 $X \Psi$ Lodge
20 $\Psi \Upsilon$ House
21 Ass't Treas. Dewey
22 $\Delta \Upsilon$ House
23 $\Phi \Gamma \Delta$ House
24 $B \Theta \Pi$ House
25 Dean Ripton
26 Tennis Courts
27 Athletic Field
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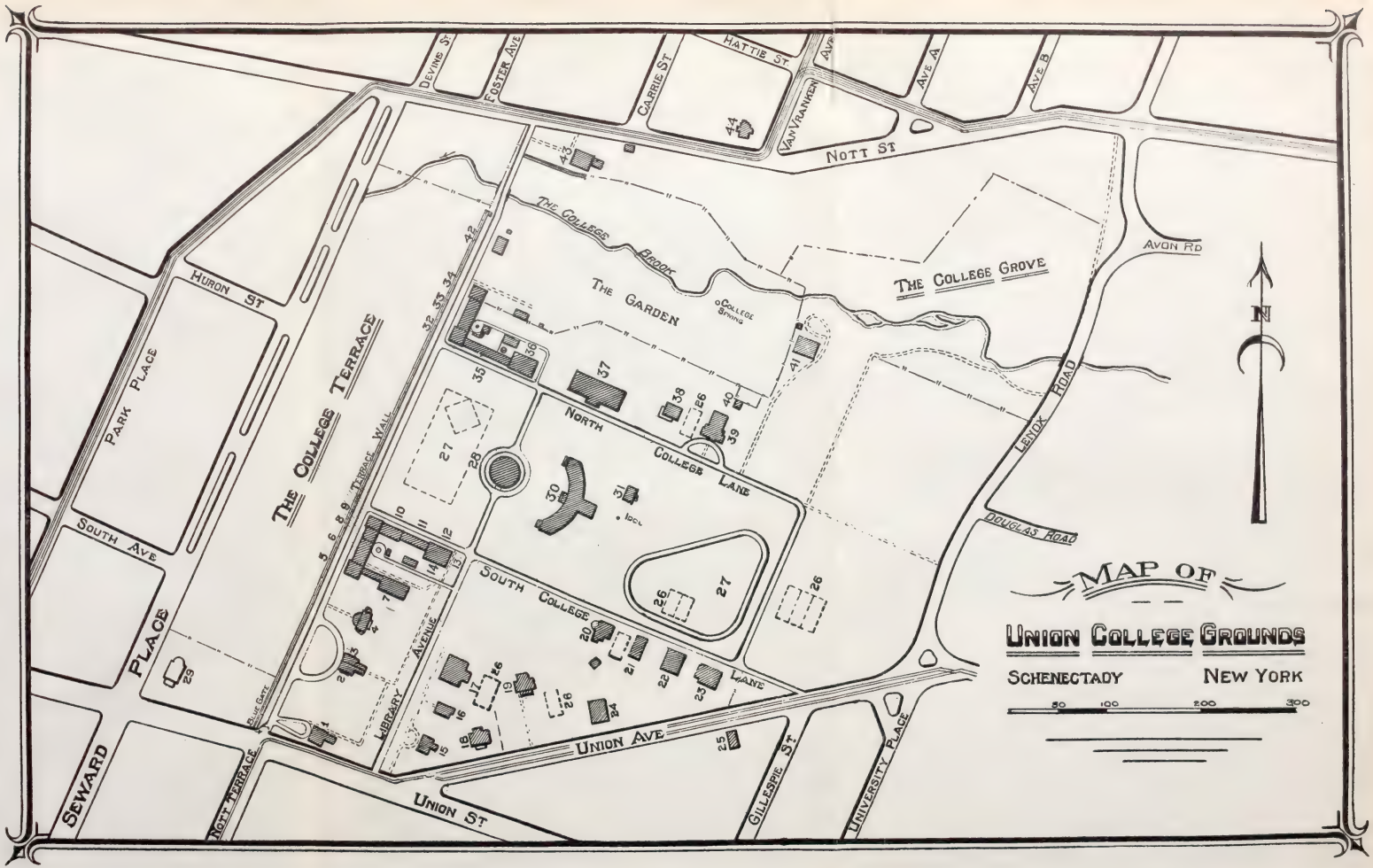
31 Central Heating Plant
32 Prof. Bennett
33 North College Dormitory (Pyramid club, B I W Fraternity, section)
34 Prof. McKean
35 Chemical Laboratory
36 Physics Laboratory (second story)
37 General Eng'ng Building
38 K A Lodge
39 Electrical Eng'ng Lab.
40 Caretaker's House
41 Barn
42 Benedict House
43 Prof. Landreth
44 $\Delta \Phi$ House



ANNUAL CATALOGUE

OF

UNION UNIVERSITY

1909-1910

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A D W

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UNION UNIVERSITY

Union University embraces the following institutions:

UNION COLLEGE, Founded 1795

Academic Department	Classical Course Latin Scientific Course Scientific Course
Engineering School (Founded 1845)	General Engineering Course Sanitary Engineering Course Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838
ALBANY LAW SCHOOL, Founded 1851
DUDLEY OBSERVATORY, Founded 1852
ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not found practicable. Schools of Law and Medicine and also an Astronomical Observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and Board of Trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the Board of Governors, June 21, 1881, and incorporated as a department of the University, August 21 of the same year.

The President of Union College and permanent Chancellor of Union University has the oversight of the University, each of the institutions having its resident Dean. The Dean of Union College acts in the place of the President in his absence, and also assists him in matters delegated to him by the President. The University Board of Governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

1909—UNIVERSITY CALENDAR—1910

1909	
13 Sept.	Fall term of Union College begins
21 Sept.	Registration for first semester of the Law School
21 Sept.	Winter term of Medical College begins
4 Oct.	Winter term of College of Pharmacy begins
2 Nov.	Election Day—Recess
25 Nov.	Thanksgiving Day—Recess
22 Dec.	Fall term of Union College ends
	Christmas Recess in all departments
1910	
3-5 Jan.	Sessions resumed in all departments
27 Jan.	Day of Prayer for Colleges
4 Feb.	First semester of Law School ends
8 Feb.	Second semester of Law School begins
22 Feb.	Washington's Birthday—Recess
24 March	Winter term of Union College ends
25-28 March	Easter Recess
29 March	Spring term of Union College begins
5-8 June	Commencement week, Union College
9-10 June	Entrance Examinations, Union College
19 Sept.	Fall term of Union College begins.
20 Sept.	Registration for first semester of Law School
20 Sept.	Winter term of Medical College begins
3 Oct.	Winter term of College of Pharmacy begins
8 Nov.	Election Day—Recess
24 Nov.	Thanksgiving Day—Recess
22 Dec.	Fall term of Union College ends

For calendars of departments, see Pages 25, 164, 176, 184

OFFICERS OF THE UNIVERSITY

Chancellor

REV. CHARLES ALEXANDER RICHMOND, D. D.

Honorary Chancellor, 1909

HON. JOSEPH H. CHOATE, LL. D.

Board of Governors

President, SIMON W. ROSENDALE, LL. D., Albany
Secretary, J. NEWTON FIERO, LL. D., Albany

Union College

SILAS B. BROWNELL, LL. D.....New York City
EDGAR S. BARNEY, Sc. D.....New York City
EDWARD WINSLOW PAIGE, LL. D.....New York City
WILLIAM F. HAVEMEYER.....New York City
GEORGE ALEXANDER, D. D.....New York City
WARNER MILLER, LL. D.....Herkimer
NICHOLAS V. V. FRANCHOT, A. M.....Olean
GEORGE F. SEWARD, LL. D.....New York City
EDWIN W. RICE, JR., PH. D., Sc. D.....Schenectady
EDWARD P. WHITE, A. M.....Buffalo
CHARLES E. SPRAGUE, PH. D.....New York City

Albany Medical College

SIMON W. ROSENDALE, LL. D.....Albany
ALDEN CHESTER .....Albany

Albany Law School

AMASA J. PARKER, LL. D.....Albany
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UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the State, and the first north of the city of New York and west of the Hudson River. It received its name from the circumstance that several religious denominations co-operated in its organization, and was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Jonathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, and resigned at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the College, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim,* and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim.* On January 28, 1909, Rev. Charles Alexander Richmond was elected president. Dr. Richmond was inaugurated June 7, 1909.

1909

	S	M	T	W	T	F	S
	..	..	..	1	2	3	4
Sept.	5	6	7	8	9	10	**11**
	12	**13**	**14**	**15**	**16**	**17**	**18**
	19	**20**	**21**	**22**	**23**	**24**	**25**
	26	**27**	**28**	**29**	**30**	..	.
	..	..	..	..	..	..	..
	..	..	..	..	..	**1**	**2**
Oct.	3	**4**	**5**	**6**	**7**	**8**	**9**
	10	**11**	**12**	**13**	**14**	**15**	**16**
	17	**18**	**19**	**20**	**21**	**22**	**23**
	24	**25**	**26**	**27**	**28**	**29**	**30**
	31	..	..	..	..	..	..

	S	M	T	W	T	F	S
	..	**1**	2	**3**	**4**	**5**	**6**
Nov.	7	**8**	**9**	**10**	**11**	**12**	**13**
	14	**15**	**16**	**17**	**18**	**19**	**20**
	21	**22**	**23**	**24**	25	26	27
	28	**29**	**30**	..	..	..	..
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	..	..	..	**1**	**2**	**3**	**4**
Dec.	5	**6**	**7**	**8**	**9**	**10**	**11**
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	26	27	28	29	30	31	..
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1910

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Jan.	2	**3**	**4**	**5**	**6**	**7**	**8**
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	23	**24**	**25**	**26**	**27**	**28**	**29**
	30	**31**	..	..	..	..	..
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Feb.	6	**7**	**8**	**9**	**10**	**11**	**12**
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Mar.	6	**7**	**8**	**9**	**10**	**11**	**12**
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Apr.	3	**4**	**5**	**6**	**7**	**8**	**9**
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	24	**25**	**26**	**27**	**28**	**29**	**30**
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May	8	**9**	**10**	**11**	**12**	**13**	**14**
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June	**5**	**6**	**7**	**8**	**9**	**10**	11
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July	3	4	5	6	7	8	9
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	31	..	..	..	..	..	..
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Aug.	7	8	9	10	11	12	13
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	28	29	30	31	..	..	..
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	..	..	..	..	1	2	3
Sept.	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	**19**	**20**	**21**	**22**	**23**	**24**
	25	**26**	**27**	**28**	**29**	**30**	..
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Oct.	2	**3**	**4**	**5**	**6**	**7**	**8**
	9	**10**	**11**	**12**	**13**	**14**	**15**
	16	**17**	**18**	**19**	**20**	**21**	**22**
	23	**24**	**25**	**26**	**27**	**28**	**29**
	30	**31**	..	..	..	..	..
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Nov.	6	**7**	**8**	**9**	**10**	**11**	**12**
	13	**14**	**15**	**16**	17	18	19
	20	**21**	**22**	**23**	24	25	26
	27	**28**	**29**	**30**	..	..	..
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Dec.	4	**5**	**6**	**7**	**8**	**9**	**10**
	11	**12**	**13**	**14**	**15**	**16**	**17**
	18	**19**	**20**	**21**	**22**	23	24
	25	26	27	28	29	30	31

Figures in heavy type indicate days on which Union College is in session

UNION COLLEGE CALENDAR

1909	
11 Sept.	Examinations for conditioned students
13 Sept.	Registration Day for Freshmen
15 Sept.	Registration Day for Students other than Freshmen
16 Sept.	First Chapel Exercises and Recitations Entrance Examinations concluded
17 Sept.	Freshman Recitations begin Y. M. C. A. Reception to Entering Students
2 Nov.	Election Day.
25 Nov.	Thanksgiving Day Recess
4 Dec.	Examinations for conditioned students
22 Dec.	Fall term ends
1910	
3 Jan.	Registration Day for Students, winter term
4 Jan.	Recitations begin
27 Jan.	Day of Prayer for Colleges
14 Jan.	Allison-Foote Prize Debate between the Literary Societies
22 Feb.	Washington's Birthday
5 March	Examinations for conditioned students
24 March	Winter term ends
25-28 March	Easter Recess
29 March	Registration Day for Students, spring term
30 March	Recitations begin
15 April	Selection of Junior and Sophomore Prize Orators
7 May	Examinations for conditioned students
15 May	Presentation of Prize Essays
20 May	Senior Examinations end
30 May	Memorial Day
5 June	Sunday. Baccalaureate Sermon
6 June	Prize Oratory of Juniors and Sophomores
7 June	Meeting of Trustees, Phi Beta Kappa, Sigma Xi, Alumni
8 June	Commencement, second Wednesday in June President's Reception
9-10 June	Entrance Examinations

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CATALOGUE—Professors Barnes, Hale, Opdyke

SCHOLARSHIPS—Professors Ripton, Bennett, Ellery

STAGE APPOINTMENTS—Professors Hughes, Ellery, March, McKean, Ferguson

ATHLETICS—Professors Opdyke, Bennett, McComber

ADMISSIONS—Professors Barnes, Ashmore, Ripton, Landreth, Hale, Bennett, Opdyke, March, Garis, Ferguson, Garrison

DISCIPLINE—Professors Ripton, Ashmore, Landreth, Hale, Bennett, Opdyke, March

SCHEDULE—Professors Garis and March, Instructor King

MUSIC—Professors McKean, Ellery, Ferguson

PREPARATORY SCHOOLS—Professors Barnes, Ellery, Garis, Instructors Cunningham, King

CONVENTIONS—Professors Ashmore, Landreth, March

EMPLOYMENT—Professors Stoller and McKean, Instructor Cunningham

ABSENCES—Professors Ellery, March, Ferguson

SENIOR CLASS—Professors Opdyke and McKean, Instructor King

JUNIOR CLASS—Professors March and Bennett, Instructor Cunningham

SOPHOMORE CLASS—Professors Stoller, Ashmore, Hughes

FRESHMAN CLASS—Professors Garis, Ferguson, Stover

COLLEGE OFFICERS

CHARLES ALEXANDER RICHMOND, D. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
College Office

FRANK BAILEY, ART. D.
Treasurer
175 Remsen St., Brooklyn

HARTLEY F. DEWEY
Assistant Treasurer
College Office

FRANK COE BARNES, PH. D.
Secretary
Room 1, Washburn Hall

JAMES H. STOLLER, PH. D.
Curator of the Museum

DEWITT CLINTON
Librarian

ESTHER G. ELY, Recorder, and Secretary to the Dean
MARIE G. STORY, Clerk to the Secretary
JANE K. LEWIS, Secretary to the President
GRACE M. MCKNIGHT, Cataloguer in Library

COURSES OF STUDY

1. Courses leading to the degree of A. B.

Course A.—Greek, as indicated on p. 40, is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. French and German are included, in addition to the ancient languages.

Course B.—This course may be pursued by candidates who satisfy the requirements for admission to the Ph. B. course. Greek is begun on entrance and required for four years. In other respects Course B is virtually identical with Course A.

2. Course leading to the degree of Ph. B.

This course offers Latin without Greek, for which is substituted additional work in modern languages and science.

3. Course leading to the degree of B. S.

This course is based upon the study of mathematics and the sciences, with extended work in English and other modern languages.

In courses 1, 2 and 3 the greater part of the work of the last two years is elective.

4. General Engineering course of four years leading to the degree of B. E.

This course offers the foundation of a broad engineering education, comprising mathematics, the sciences, the fundamental principles of the special branches of the profession, some training in history and economics, a knowledge of both French and German and a course in English. During the third and fourth years two alternative options are offered in this course:

Option A.—In which the fundamental principles of advanced technical subjects receive emphasis.

Option B.—In which studies are offered which lead to a training for engineering positions of an executive or administrative nature.

5. General Engineering course of six years leading to the degrees of B. E. and Ph. B.

This course combines the above four-year Engineering course No. 4, including both its options, with the Latin Scientific course, No. 2. The subjects of the two courses are interwoven throughout each term and the course thus offers in carefully arranged form a combined college and technical training.

6. Sanitary Engineering course leading to the degree of B. E.

This differs from course 4 in substituting special work in Sanitary Engineering for some of the General Engineering studies.

7. Electrical Engineering course leading to the degree of B. E.

This course is intended to give a broad and thorough engineering education, with the specific instruction requisite for Electrical Engineering.

8. Graduate course in General or in Sanitary Engineering leading to the degree of M. C. E.

This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the General or the Sanitary Engineering course of Union College, or of any other institution of a standing recognized by the Faculty.

9. Graduate course in Electrical Engineering leading to the degree of M. E. E.

This course of one year's graduate study consists of lectures, laboratory practice and research work, and is open to graduates of the Electrical Engineering course of Union College, or of any other institution of a standing recognized by the Faculty.

Students having the profession of Medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the first two terms of the Senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

ADMISSION

General Conditions

The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Monday, Wednesday and Thursday of the first week of the Fall term, as indicated in the calendar.

All candidates will be examined in the English requirements, and all candidates for admission to the B. S. course or to any one of the B. E. courses will be examined in plane trigonometry.

Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board. The examinations of the Board will be held in June 20-25, 1910, and a list of the places at which they are to be held will be published by the Board about March 1st. Applications to attend the Board's examinations must be addressed to the Secretary of the College Entrance Examination Board, P. O. Sub-Station 84, New York, N. Y., and must be made upon a blank form to be obtained from the Secretary of the Board upon application.

A college entrance diploma issued by the New York State Education Department will be accepted so far as it covers the requirements for admission, except in trigonometry.

Except in English and trigonometry, certificates from schools approved by the Faculty will be accepted, if they cover the requirements. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the Secretary of the Faculty. Students who enter the Freshman class by certificate and fail to maintain their class standing cannot enter the next Freshman class, except by passing the entrance examinations in the departments in which they have failed.

Candidates must be at least sixteen years old, and, as a preliminary to the entrance examinations, they must present to the President satisfactory testimonials of character, and register (see pages 43-44) for the necessary examinations.

Advanced Standing

Candidates from other colleges must bring letters of honorable dismissal, and upon the presentation of acceptable certificates will be admitted to corresponding standing.

Candidates for a degree must enter not later than the beginning of the Senior year.

Requirements for Examination in 1909

1. A. B. Courses

Course A.—Candidates for admission to the Freshman class in Course A. leading to the degree of A. B. will be examined in subjects Nos. 1, 2, 3, 5, 8 and 9, of the list of subjects specified on pages 38-42.

Course B.—Candidates for admission to the Freshman class in Course B. leading to the degree of A. B. will be examined in subjects Nos. 1, 3, 4, 5, 8 and 9, of the list of subjects specified on pages 38-42.

2. Ph. B. Course

Candidates for admission to the Freshman class in the course leading to the degree of Ph. B. will be examined in subjects Nos. 1, 3, 4, 5, 8 and 9, of the list of subjects specified on pages 38-42.

3. B. S. Course

Candidates for admission to the Freshman class in the course leading to the degree of B. S. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8 and 9, of the list of subjects specified on pages 38-42.

For admission to this course, Latin (No. 3) may be offered, instead of a modern language (No. 4), if desired.

4, 5, 6, 7. B. E. Courses

Candidates for admission to the Freshman class in any one of the four year courses leading to the degree of B. E. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8 and 9, of the list of jects specified on pages 38-42.

Candidates for admission to the Freshman class in the six year course leading to the degree of B. E. and Ph. B. will be examined in subjects Nos. 1, 4, 5, 6, 7, 8 and 9, and also Latin (No. 3), of the list of subjects specified on pages 38-42.

List of Subjects

1. English

All candidates for admission to the Freshman class will be required to pass a written examination in English, and no candidate will be admitted whose work is seriously defective in spelling, punctuating, grammar, or division into paragraphs.

Questions will be set on topics and extracts drawn from the following books. The first list consists of works to be read carefully, with a view to the absorption of the subject matter, *i. e.* as books are generally read. The second list consists of books to be read with critical care, in annotated editions, and with reference to dictionary, grammar and rhetoric. The questions on this set will relate to literary form and logical structure, as well as to substance.

List (1) *for General Reading*

Nine books are to be selected as follows:—

Group I (two to be selected)

Shakespeare's "As You Like It," "Henry V," "Julius Cæsar," "The Merchant of Venice," "Twelfth Night."

Group II (one to be selected)

Bacon's "Essays;" Bunyan's "The Pilgrim's Progress," Part I; "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography."

Group III (one to be selected)

Chaucer's "Prologue;" Spenser's "Faerie Queene" (selections); Pope's "The Rape of the Lock;" Goldsmith's "The Deserted Village;" Palgrave's "Golden Treasury" (First Series) Books II. and III., with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected)

Goldsmith's "The Vicar of Wakefield;" Scott's "Ivanhoe;" Scott's "Quentin Durward;" Hawthorne's "The House of the

Seven Gables;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" Dicken's "A Tale of Two Cities;" George Eliot's "Silas Marner;" Blackmore's "Lorna Doone."

Group V (one to be selected)

Irving's "Sketch Book;" Lamb's "Essays of Elia;" De Quincey's "Joan of Arc" and "The English Mail Coach;" Carlyle's "Heroes and Hero Worship;" Emerson's "Essays" (Selected); Ruskin's "Sesame and Lilies."

Group VI (two to be selected)

Coleridge's "The Ancient Mariner;" Scott's "The Lady of the Lake;" Byron's "Mazeppa" and "The Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series) Book IV, with especial attention to Wordsworth, Keats and Shelley; Macaulay's "Lays of Ancient Rome;" Poe's "Poems;" Lowell's "The Vision of Sir Launfal;" Arnold's "Sohrab and Rustum;" Longfellow's "The Courtship of Miles Standish;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine," and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Evelyn Hope," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "The Boy and the Angel," "One Word More," "Hervé Riel," "Pheidippides."

List (2) for Minute and Critical Study

Shakespeare's "Macbeth;" Milton's "Lycidas," "Comus," "L'Allegro," and "Il Penseroso;" Burke's "Speech on Conciliation with America," or Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

Attention is called to the fact that while no examination in grammar or rhetoric, as such, will occur, yet a knowledge of the essential principles of grammar and of the elementary principles of rhetoric is involved in the above requirements. An acquaintance with the general outline of the development of English literature will also be required. Newcomer's "Introduction to English Literature" and Moody and Lovett's "First View of English Literature" are recommended.

2. Greek

(a) Goodwin's Greek Grammar; Pearson's "Greek Prose Composition," or an equivalent; Xenophon's "Anabasis," four books; Homer's "Iliad," three books, including Prosody.

(b) Greek History.

(c) The Geography of Ancient Greece.

The attention of instructors is particularly directed to the student's need of a full and accurate knowledge of the Greek and the Latin Grammar.

3. Latin

(a) In addition to the usual first year's (elementary) Latin of the High School course, which includes Latin (prose) writing, the following authors (or parts of authors) are required: Four books of Caesar's Gallic War, six books of Vergil's Æneid, and six orations of Cicero. Equivalents will be accepted at the discretion of the head of the department. These requirements presuppose a four-years' course, either at the public high school or at an approved school of similar standing. A student who has been otherwise prepared will be expected to be proficient also in two thousand lines of Ovid and in Sallust's "Catiline" or "Jugurtha." Every student is required to use in the College class room the "Roman Method" of pronunciation, and is expected to have had practice in this method at school.

The grammars of Allen and Greenough (New), Harkness (Complete), Gildersleeve-Lodge, Bennett, Lane and Morgan, and West, are recommended.

(b) Roman History (e. g., Botsford's).

(c) Geography of the Roman Empire, including the geography of the ancient Greek world.

4. Modern Languages

Either

German.—A knowledge of grammar, comprising declension of nouns, adjectives and pronouns; conjugation of verbs; the rules of syntax and word order; a good facility in correct pronunciation and the ability to write from dictation.

Ability to translate at sight a passage of German prose or poetry of ordinary difficulty, and to convert simple English sentences into German. The candidate must have read from 300 to 400 pages of prose and poetry from various standard authors.

Two years' work will ordinarily be necessary to meet this requirement.

Or

French.—A knowledge of grammar, comprising the forms of nouns, adjectives and pronouns; conjugation of verbs; the rules of syntax; the more common idioms; a good facility in correct pronunciation and the ability to write from dictation.

Ability to translate at sight a passage of modern French prose or poetry of ordinary difficulty, and to convert into French simple English sentences founded upon it. The candidate must have read from 300 to 400 pages of prose and poetry from various standard authors.

Two years' work will ordinarily be necessary to meet this requirement.

The outline of work for the first two years of study in these languages as prescribed by the College Entrance Examination Board is recommended as indicating the scope of the above requirements.

5. Mathematics a

Arithmetic; Algebra, including quadratic equations, proportions, progressions and logarithms; Plane Geometry.

In arithmetic the examination will be on the following subjects: factors and multiples, common and decimal fractions, square root, the more important tables and operations of denominate numbers, percentage and simple interest, compound interest for integral periods only, bank discount, stocks and bonds, and the metric system.

In his preparation in algebra the candidate should give special attention to factoring, fractional exponents and radicals, and the solution of quadratic equations by factoring and by the formula resulting from the solution of the equation $ax^2+bx+c=o$.

6. Mathematics b

Solid Geometry and Plane Trigonometry. No certificate covering the requirement in plane trigonometry will be accepted.

7. Physics

An elementary knowledge of physics, such as may be gained by a year's course of study covering mechanics, sound, heat, light and electricity, as treated in any standard high school text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

8. History of the United States

9. Physiology

Entrance Examinations

1910

Entrance examinations will be held at the college in **June** and in **September,** in accordance with the schedule given below. Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 9

9 A. M. Candidates will present their credentials at the office of the President and register for examination.

11 A. M. to 1 P. M. ..... Algebra
Physiology
2 P. M. to 4 P. M. ..... U. S. History
Physics
3 P. M. to 5 P. M. ..... English

Friday, June 10

9 A. M. to 11 A. M. ..... Latin
Solid Geometry
11 A. M. to 1 P. M. ..... German
French
2 P. M. to 4 P. M. ..... Greek
Plane Geometry
Plane Trigonometry

Schedule of the September Examinations

Monday, September 19

9 A. M. and 2 P. M. Candidates will present their credentials at the office of the President and register for examination.

Wednesday, September 21

9 A. M. to 11 A. M. ..... Physics
Physiology
11 A. M. to 1 P. M. ..... Algebra
2 P. M. to 4 P. M. ..... U. S. History
3 P. M. to 5 P. M. ..... English

Thursday, September 22

9 A. M. to 11 A. M. ..... Latin
Solid Geometry
11 A. M. to 1 P. M. ..... German
French
2 P. M. to 4 P. M. ..... Greek
Plane Geometry
Plane Trigonometry

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT

In Course A, leading to the degree of Bachelor of Arts, Greek is required during the Freshman and Sophomore years, and may be elected during the Junior and Senior years; in Course B, leading to the degree of Bachelor of Arts, Greek is begun on entrance and required for four years.

1. **Greek Grammar; Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phaedo; **Aristophanes:** The Clouds.

Required of Freshmen in Course A. Four hours weekly throughout the year.

2. **The Elements of Greek**

Required of Freshmen in Course B. Four hours weekly throughout the year.

3. **Aeschylus:** Prometheus Vinctus; **Sophocles:** Oedipus Tyrannus; **Euripides:** Medea; **Herodotus; Homer.**

Required of Sophomores in Course A. Three hours weekly throughout the year.

4. **Xenophon:** The Anabasis

Required of Sophomores in Course B. Three hours weekly throughout the year.

5. **Homer; Thucydides**

Elective for Juniors in Course A. Two hours weekly throughout the year.

6. **Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phaedo.

Required of Juniors in Course B. Two hours weekly throughout the year.

7. **Aeschines:** Against Ctesiphon; **Demosthenes:** De Corona; **Theocritus.**

Elective for Seniors in Course A. Two hours weekly throughout the year.

8. **Homer**

Required of Seniors in Course B. Two hours weekly throughout the year.

The above courses are typical only. The books read are varied from year to year.

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9. **Honors:** Candidates for honors in Greek, either in A. B. Course A, or in A. B. Course B, will be required to take all the work in Greek offered in their respective courses, to maintain a general average of ninety per cent. in that work, to meet for two additional hours a week during the first two terms of the Senior year for the study of a Greek text, and to write theses on assigned subjects.

The Latin Language and Literature

PROFESSOR ASHMORE

The studies of this department are required, in the Freshman and Sophomore years, of all students who are candidates for either one of the two degrees, A. B. and Ph. B. In the Junior and Senior years Latin becomes an elective study, except for students who are candidates for Honors in Latin; of these it is required.

1. **Livy:** Book I or an equivalent; Roman History.—**Tacitus:** Agricola and Germania.—**Cicero:** De Senectute or De Amicita or De Officiis (Book I). Latin Composition.

Required of Freshmen in the A. B. and Ph. B. courses. Four hours weekly throughout the year.

2. **Horace:** Selected Odes and Epodes.—**Terence:** One or more of the plays.—**Plautus:** Captivi or an equivalent. Lectures on Ancient Comedy.

Required of Sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Juvenal** and **Horace:** Satires. History of Roman Literature. Lectures on Archaeological Topics.— **Pliny the Younger** or **Cicero:** Letters. Private Life of the Romans.

Elective for Juniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

4. **Lucretius:** Selections. Lectures on the Atomic Theory and the Philosophy of Epicurus.—The literature of the Empire: **Suetonius** or **Seneca** or **Quintilian** or **Martial.**—Early Latin or some subject especially suited to students intending to become teachers.

Elective for Seniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

In general subsidiary reading will be recommended all along the line. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years, if the head of the department should deem it advisable.

4a. **Honors:** Candidates for special honors in Latin are required to take the Latin of the four years, to do additional reading in private, as indicated by the head of the department, and to prepare a thesis on some subject directly related to the work of the class room or to the additional reading referred to.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH
INSTRUCTOR STOVER AND INSTRUCTOR PARKER

A reliable practical knowledge of the language studied is the first result aimed at in all the classes, but as soon as possible the literary side of the language is brought to the front, and good books are read for what they contain. The more advanced

courses vary somewhat from year to year, according to the judgment and preference of the instructors, and the ability and character of the students composing the classes.

German

1. **Elementary.** Grammar study: with exercises and supplementary composition; reading and memorizing; use of German in class. German reader and selections on popular scientific subjects.

Required in all courses of Freshmen who offer French at entrance and in the B. S. course of those who offer Latin. Three hours weekly throughout the year.

1a. **Elementary.** Grammar, Reader and Exercises. Schiller: Wilhelm Tell; Goethe: Hermann und Dorothea.

Required of Sophomores in the A. B. course and of Freshmen as in 1 who have had one year of German in school. Three hours weekly throughout the year.

2. **Intermediate.** Grammar for review and reference; connected composition; use of German in class. The time in class is devoted to the reading and discussion of selected works from the German classics and from recent drama and fiction; matter is also assigned for outside reading with reports and examination on the work done. The work varies somewhat from year to year, but aims to give every class an acquaintance with some of the masterpieces of German literature and some knowledge of present day German life and institutions.

Required in the Ph. B., B. S. and B. E. courses of Freshmen who offer German at entrance; in the A. B. (B.), Ph. B. and B. S. courses of Sophomores who have had German 1; and in the A. B. course of Sophomores who have had two years of German before entrance. Elective in the A. B. course of Juniors who have had 1a. Three hours weekly throughout the year in the Ph. B. and B. S. (or A. B.) courses and during terms 1 and 2 in the B. E. course.

2a. Intermediate. This is a course in the reading of scientific German. A reader consisting of selections on scientific subjects forms the basis of the work and is supplemented by one or more monographs on technical subjects within the grasp of the class at this stage of its work.

Required, during the third term, of B. E. members of German 2. Three hours weekly through the term.

3. Advanced. Nineteenth century drama, development and leading representatives. Readings from Von Kleist and Grillparzer. Das junge Deutschland; assigned study. Readings from Hebbel, Ludwig and Von Wildenbruch. Die freie Bühne; assigned study. Nineteenth century fiction. Readings from Sudermann, Hauptmann, Meyer, Scheffel and others.

Elective for Juniors in the Ph. B. and B. S. courses who have done 2 and for Juniors in the A. B. course who have done 1a with a grade of 90. Required, as an alternate with French, of Sophomores in the Ph. B. and B. S. courses who in Freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

3a. Advanced. Goethe and the classical period, readings and assigned studies. Lessing: Nathan der Weise, Emilia Galotti; Schiller: Wallenstein, Maria Stuart, Jungfrau von Orleans. Outline study of the lives of these writers. Koch: Geschichte der deutschen Literatur as a handbook, with references to other works.

This course alternates with course 3 and is given under the same conditions.

3b. Special. This course is given in three sections: (a) A course in composition and conversation, based on Stern's Geschichten von deutschen Städten or a similar work; (b) A course in commercial German, consisting of reading, correspondence and newspaper work; (c) A course in the reading

of historical and political matter, with composition based on the articles read.

This course may be substituted for course 3a, and is given under the same conditions.

4. Advanced. Goethe: (1) A study of Goethe's life and works with readings from his autobiography and epic writings: Egmont, Iphigenie auf Tauris, Torquato Tasso. (2) Faust: Part I, reading and interpretation; the Faust legend in literature.

Elective for Seniors in the A. B., Ph. B. and B. S. courses who have had necessary previous training. This course will ordinarily follow course 3. Two hours weekly throughout the year.

4a. Advanced. (a) History of German literature: Reading and discussion in class with references to various works, accompanied by Musterbuch and special assignments. (b) A course in Middle High German: Grammar and reading, supplemented by an outline study of the history of the language. Two hours weekly throughout the year.

This course alternates with course 4 and is given under the same conditions. It is expected that those electing it will have had course 3a. It is intended primarily for students who are preparing to teach German.

4b. Special. This course consists in the reading of one or more historical monographs and, when time allows, a historical novel, with parallel readings; followed by a careful study of a number of political speeches and parliamentary addresses, with discussion of the topics involved; supplemented by the reading of newspaper reports and editorial articles. The work aims to lay the foundation for future study along these lines and to give some insight into present governmental and social conditions in Germany.

This course may be substituted for course 4a, and is given under the same conditions.

4c. Honors. Special courses, open only to members in good standing in Senior Elective German, are offered to candidates for honors in this department.

French

1. Elementary. Grammar and the reading of simple French texts. Constant drill in grammatical forms, common idioms, pronunciation and writing to dictation.

Required of Freshmen in the A. B. course (A); of Freshmen in the A. B. (B), Ph. B., B. S., and B. E. courses who offer German at entrance; and in the B. S. course of those who offer Latin. Three hours weekly throughout the year.

1a. Elementary. Grammar reviewed; composition; selected readings of second year or higher grade.

Required, in place of French 1, of those who have had one year of French before entrance.

2. Intermediate. Grammar reviewed; composition, writing to dictation, and memorizing. In addition to daily translation in class, easy reading is assigned to be done outside and reported upon. Since this course is for most students the last required French in college, it is devoted to selected works of various periods. The number and character of the books read may vary considerably from class to class.

Required of Freshmen in the Ph. B. and B. S. courses who offer French at entrance; in the A. B. course of those who have had two years of French before entrance. Three hours weekly throughout the year.

2a. Intermediate. This course is similar to course 1a.

Required of Sophomores in the A. B. (B), Ph. B. and B. S. courses who have had French 1. Three hours weekly throughout the year.

3. Advanced. French literature of the 19th Century. Discussion of various authors and of some phases of modern French life and character; assigned reading; careful translation in class. With suitable classes, attention is paid to French etymologies, and the laws of the evolution of the language.

Elective for Juniors of the A. B., Ph. B. and B. S. courses. Required, as an alternate with German, of Sophomores in the Ph. B. and B. S. courses who in Freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

4. Advanced. French literature of the 17th Century. Selected works of Corneille, Racine, Molière, and La Fontaine, are read carefully in class. Assigned readings, discussions of men, of their work and of the period.

Elective for Seniors of the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

This course may in any year be a continuation of course 3.

4a. Honors. Advanced courses, leading to special honors in French, are offered to those students who are qualified to pursue them.

Spanish

1. Junior Elective. Grammar, exercises and reader; practice and sight translation. Selections from Gil Blas, a recent novel and a modern play are read.

Open to Juniors in the A. B., Ph. B. and B. S. courses and to Seniors who have not had Spanish in Junior year. Three hours weekly throughout the year.

2. Senior Elective. Grammar and composition. In connection with a brief survey of the development of Spanish literature, one or two dramas of the classical period and one or two modern plays are read, together with some works of recent fiction. The amount read depends upon the nature of the works selected and the ability of the students composing the class.

Open to Seniors who have had Spanish 1. Two hours weekly throughout the year.

English Language and Literature

PROFESSOR HALE

1. **Old English.** This course gives an introduction to the language in Cook's First Book in Old English, with especial attention to the phonology and the relations of Old and Modern English with the other Teutonic languages. In the third term the work is carried on either by a study of Old English poetry in "Beowulf" or by further reading in West Saxon prose, especially the Chronicle.

Elective for Juniors in all courses. Two hours weekly throughout the year.

For this course may be substituted on request a course on the History of the English Language.

2. **History of English Literature.** This study is pursued with a text-book for the purpose of giving a foundation knowledge of the facts of English Literature.

Required of Sophomores in the A. B., Ph. B. and B. S. courses. Two hours weekly during the fall and winter terms.

3. **Shakespeare.** A careful reading of "Hamlet," with particular attention to the language, action and characters, and a summary of questions of text, date, and sources. A view is also given of the conditions of the Elizabethan theatre, and the general standpoint taken is that of the acted drama.

Required of Sophomores in the B. E. course during the fall term, and of Sophomores in the A. B., Ph. B. and B. S. courses during the spring term. Three and two hours respectively.

4. **Shakespeare.** A study of plays chosen to represent the different periods of Shakespeare's life and the different forms of the Shakespearean drama. Six plays will be read each year, different plays being chosen each year from those of the year before. In 1908-1909 the chief tragedies were read.

Elective for Seniors and Juniors in all courses. One hour weekly throughout the year.

5. **Modern Literature.** The study of some great poem of the nineteenth century: in 1908-1909 the essays of Macaulay and Carlyle on Boswell's Johnson were the subject.

Required of Sophomores in the B. E. course. Two hours weekly during the winter term.

6. **English Prose.** The course considers especially the novel, the short story and the essay. In each case especial attention is given to the general character of the literary form in question and the specific character of the different authors that can be treated. In the first term Perry's "Study of Prose Fiction" has been used: in the other terms the work is carried on without a text-book.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

7. **English Poetry of the Nineteenth Century.** An introduction to the critical study of poetry. Page's "British Poets of the Nineteenth Century" furnishes a collection of texts in which the work may readily be followed. The main plan is to form habits of discrimination, and a poetic taste by distinguishing between the characteristics of the different poets read.

Elective for Seniors in all courses. Two hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors are offered to those students who are qualified to pursue them. In 1908-1909 the topic was "The Stage History of Shakespeare's Plays."

Rhetoric and Public Speaking

PROFESSOR MCKEAN

1. **Freshman Rhetoric.** The work is pursued by means of recitations, written exercises, criticisms, discussions and informal lectures.

Required of Freshmen in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

1a. **Freshman Rhetoric.** The work is pursued as in course 1. The instruction, however, is somewhat more technical and scientific in general character than that of course 1.

Required of Freshmen in the B. E. course. Two hours weekly throughout the year.

2. **Sophomore Rhetoric.** The work consists in the writing of orations with criticism and a delivery of them, either in special appointments or before the class, and the writing and criticism of essays.

Required of Sophomores in the A. B., Ph. B. and B. S. courses during the second and third terms, and in the B. E. course throughout the year. One hour weekly.

3. **Junior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all Juniors. One hour weekly throughout the year.

4. **Argumentation and Debate.** The work follows a text-book on the art of debate during the fore part of the year. Following this, considerable practice is given in the preparation of briefs and arguments and in oral debates.

Elective for Juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

5. **Advanced Argumentation and Debate.** The work is like that of course 4, but of a more advanced character.

Elective for Seniors in the A. B., Ph. B. and B. S. courses who have completed course 4.

6. **Senior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all Seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

6a. Senior Rhetoric. One literary essay each term.

Required of Seniors in the B. E. course during the fall and winter terms.

History and Sociology

PROFESSOR RIPTON AND DR. POLLOCK

The work of the department covers three years, beginning with the first term of the Sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. English History. The narrative history of England is made the basis of study, but especial attention is given to the industrial, commercial and social history of the country, and to the development of the English Constitution. The importance of collateral readings from the English authorities is emphasized.

Required of Sophomores in A. B., Ph. B. and B. S. courses. Two hours weekly, first and second terms.

2. French History. Beginning with a brief study of Roman Gaul, the main purpose is to show the growth of the French nation and the development of the feudal monarchy into the absolute monarchy of the old régime. The period studied concludes with the year 1789. The history of France from that date to the present is taken up in greater detail in Course 4.

Required of Sophomores in A. B., Ph. B. and B. S. courses. Two hours weekly, third term.

3. American History. A study is made of the period of American discovery and exploration and of the colonial period. The main part of the work, however, begins with an examination of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for Juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of Juniors in the B. E. courses. Two hours weekly throughout the year.

4. French Revolution and Nineteenth Century. This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. It then takes up an examination of the events and forces which contributed to the unification of Italy and of Germany, and concludes with a brief study of the Eastern Question. The course is designed to give a clear understanding of political affairs as they exist in Europe to-day and the historical processes by which they were brought about.

Elective for Seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

5. Comparative Politics. A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of Continental Europe. Sufficient attention is given to historical origins to account for characteristic differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the distribution of governmental powers, and their practical operation, including some account of political parties.

Elective for Seniors. Two hours weekly throughout the year.

6. Economics. It is the design of this course to give instruction in the leading principles of Economics. While a textbook is used in order to secure more rapid progress, still the views of no school are taught exclusively. By lectures and required collateral reading an attempt is made to present the results of the latest and most approved investigations in the science.

Required of Seniors in all courses. Three hours weekly, first term.

7. Sociology. In this course the mutual relations of men in society are examined historically, that the student may learn how present conditions have resulted from past experience. Present social forces and needs are considered, with the purpose

of training the students to fulfil the demands of good citizenship. Collateral reading and practical sociological investigation are guided throughout the course by lectures.

Required of Seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. Honors. Candidates for Special Honors in History are assigned subjects for study which are designed to give training in historical method and the use of sources.

Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the Junior year and extend through the entire Senior year. Logic, Elementary Psychology and Elementary Ethics come in the Junior year and are required. All the other courses are taken up in the Senior year and are elective. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. Logic. This study, inasmuch as it is required, is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies. Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

2. Elementary Psychology. This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of Psychology to the other sciences is set forth, and the importance of the study is emphasized in

that it lays the foundation for all the sciences of man as a political, moral and religious being.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. Elementary Ethics. Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. Advanced Psychology. The chief problems discussed in this course are the recent views concerning the nature of perception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal Psychology are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. Advanced Ethics. Some account of the history of Ethics is given in this course, and present ethical theories are stated and discussed. The relation of Ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. Evolution of Religion. The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and

defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. History of Philosophy. The attempt is made in this course to go over with considerable detail the general field of Philosophy from the earliest times down to the present day. In this way the views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity of knowledge, the nature of virtue, the foundations of the State and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. Honors. Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Mathematics

PROFESSOR GARIS

Mathematics is required in the A. B., Ph. B. and B. S. courses during the Freshman year and is elective during the Sophomore, Junior and Senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. Solid Geometry

Required of Freshmen in the A. B. and Ph. B. courses. Four hours weekly during the first term.

2. Higher Algebra

Required of Freshmen in the B. S. course during the first term, and of Freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

3. Trigonometry

Required of Freshmen in the A. B. and Ph. B. courses. Three hours weekly during the third term.

4. Plane Analytic Geometry

Required of Freshmen in the B. S. course. Three hours weekly during the second and third terms.

5. Theory of Equations

Elective for Sophomores in the A. B. and Ph. B. courses. Two hours weekly during the first term.

6. Plane Analytic Geometry

Elective for Sophomores in the A. B. and Ph. B. courses. Two hours weekly during the second and third terms.

7. Solid Analytic Geometry

Elective for Sophomores in the B. S. course and for Juniors in the A. B. and Ph. B. courses who have had 6. Two hours weekly during the first term.

8. Differential Calculus

Elective for Sophomores in the B. S. course and for Juniors in the A. B. and Ph. B. courses who have had 7. Two hours weekly during the second and third terms.

9. Integral Calculus

Elective for Juniors in the B. S. course and for Seniors in the A. B. and Ph. B. courses who have had 8. Two hours weekly throughout the year.

10. Differential Equations

Elective for Seniors in the B. S. course who have had 9. Two hours weekly during the first and second terms.

11. Theory of Functions

Elective for Seniors in the B. S. course who have had 10. Two hours weekly during the third term.

12. Honors. Candidates will be given advanced work in various subjects suited to their special ability.

Open to Seniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

The required work in Physics extends through the three terms of the Sophomore year. This is followed by electives in laboratory work and in Mathematical Physics. The collection of apparatus for the illustration of lectures is extensive, and has been secured largely from foreign makers, including sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in more detail are these:

1. General Physics. This course is intended to give a general presentation of the facts and laws of Physics. No knowledge of mathematics is assumed beyond an acquaintance with Algebra and Plane Trigonometry. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of Physics and their explanation.

Required of Sophomores in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

1a. Elective in Laboratory Work. This course is open to those who have taken 1, and consists of individual work by the students themselves in the laboratory. The experiments per-

formed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

Elective for Juniors and Seniors in the A. B., Ph. B. and B. S. courses. Two periods of two hours each weekly throughout the year.

2. General Physics for Engineers. This course treats the subject more mathematically than 1, and is given to students in the Engineering course. The Calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of Physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of Sophomores in the B. E. course. Two, three and three classroom hours a week throughout the first, second and third terms, respectively; and one laboratory period a week throughout the year.

2a. Elective in Mathematical Physics. This course is open to those who have taken 2, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of Calculus is required, and an elementary knowledge of Differential Equations. Some time is devoted to a further study of Differential Equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for Juniors and Seniors who have taken 2. Two hours a week throughout the year.

3. Astronomy. A short course in Astronomy is also given. This course is general and descriptive in character, including some reference to the more elementary mechanical aspects of the subject.

Required of Juniors in the A. B. and B. S. courses, and open as an elective to the Juniors in the Ph. B. course. Three hours a week throughout the second term.

4. **Spherical Trigonometry and Astronomy.** This course differs from the preceding in that it begins with the study of Spherical Trigonometry as applied to some of the problems of practical Astronomy. The course is less descriptive and more mathematical than 3.

Required of Juniors in the General Engineering course, Option A, and in the Sanitary Engineering course. Three hours a week throughout the third term.

5. **Honors.** Candidates for Special Honors must have taken the elective in Mathematical Physics (2a) and are required to complete a special course of assigned work and reading, extending throughout the Senior year, and to submit theses.

Chemistry

PROFESSOR ELLERY AND INSTRUCTOR EASTMAN

The object of the instruction in this department is to develop power of accurate observation, of logical reasoning, and of forming correct judgments on observed facts. Students who are planning special courses in Chemistry, Medicine, Biology, Geology, or other branches of natural science, will find the courses of great value.

1. **General Chemistry.** The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of Chemistry, a special study of the common metals, and an introduction to Organic Chemistry. The work is distributed through the year as follows:

Fall term: Theories and general principles; study of the occurrence, preparation and properties of the non-metals.

Two lectures and one laboratory period each week.

Winter term: Study of the occurrence, metallurgy and properties of the common metals, and reactions for the metals in solution.

Two lectures and one laboratory period each week.

Spring term: Study of reactions of acid radicals in solution. Elementary blowpipe analysis.

One lecture and four laboratory periods each week.

Required of Sophomores in the B. E. course.

1a. General Chemistry. This course is similar to course 1, in that it includes the study of metals and non-metals, theories and principles, but no analytical work is done.

Required of Freshmen in the B. S. course, and of Sophomores in the Ph. B. course. Elective for Juniors and Seniors in the A. B. course. Two lectures and one laboratory period a week throughout the year.

2. Qualitative Analysis. This course comprises a systematic examination of metals and acid radicals in solution, and a systematic examination of complex solids.

Required of Juniors in the B. E. course. Three laboratory periods a week during the fall term.

2a. Qualitative Analysis. A study of the reactions of bases and acids in solution, a complete course in blowpipe analysis, a systematic examination of solutions of metals and acids, and of complex solids., The aim of the year's work is to enable the student to make a complete qualitative analysis of complex inorganic substances.

Required of Sophomores in the B. S. course, elective for Juniors and Seniors in the Ph. B. course, and for Seniors in the A. B. course who have had course 1a. Three laboratory periods a week throughout the year.

3. **Quantitative Analysis.** This is a course in which the student becomes familiar with the various gravimetric and volumetric methods of analysis.

Elective for Juniors in the B. S. course, and for Seniors in the Ph. B. course, who have had course 2a. Three hours a week throughout the year.

4. **Organic Chemistry.** This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry.

Elective for Seniors in the B. S. course, who have had course 3. Three hours a week throughout the year.

5. **Special Analyses.** This course includes Quantitative Analysis, both gravimetric and volumetric determinations of common elements, a thorough course in Water Analysis, comprising a study of proper sanitary conditions, as well as complete chemical analysis of various samples of water, collected by the student, and a short course in milk analysis.

Required of Seniors in the Sanitary Engineering course. Two hours a week during the fall and winter terms.

6. **Honors.** Students who have completed course 3 and whose grades in all the work of the department meet the requirements, are eligible to honors in the subject of Chemistry. Such students are required to do some special analytical work and to submit a thesis on the results of their investigations.

Biology and Geology

PROFESSOR STOLLER

1. **General Biology.** This course is intended to give the student a knowledge of living plants and animals, to afford mental training in the study of nature, and to give the student a grasp of the broader facts and principles of biological science

in their general philosophical values. Recitations and laboratory work.

Required of Sophomores in the B. S. course, three hours weekly throughout the year, and of Juniors in the Ph. B. course during the first two terms.

2. Animal Morphology. This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for teaching or for the medical profession. The work is mainly in the line of comparative anatomy, and includes the dissection of several vertebrate types in detail. Some time is given to elementary histology and embryology, involving the technique of section-cutting, etc. The course includes the reading of texts in general zoology and embryology.

Elective for Seniors in the A. B., Ph. B. and B. S. courses. Three hours (six hours of laboratory work) weekly throughout the year.

3. Bacteriology. Students who have elected course 2 may be permitted to take, in the third term, elementary practical bacteriology as an extra or in place of a part of the anatomical work.

4. General Principles of Zoology. The aim of this course is to use the data of zoology for their worth as contributing to liberal culture. The more general facts and principles of animal structure, function and development are reviewed and considered in their relation to the study of man. The scientific evidences of organic evolution and the theories of evolution of various authors are considered. Lectures.

Required of Juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

5. Sanitary Biology. In this course those organisms especially bacteria, which bear a causal relation to disease and the

recent applications in sanitary science of our knowledge of the nature of these organisms, are considered. Recitations and lectures accompanied by demonstrations.

Required of general and sanitary engineers in the Senior Class. Two hours weekly during the second term.

6. General Geology. The instruction in this course is adapted primarily to the study of the science as a branch of liberal culture, but enough practical work is included to afford a foundation for special study or for teaching. The work includes laboratory study in determining the common minerals and rocks, and some field work in structural and historical geology.

Required of Juniors in the A. B. and B. S. courses; elective in the Ph. B. course. Three hours weekly in the first term.

7. Field Geology. This course is supplementary to the preceding. The geological formations readily accessible from Schenectady are inspected, fossils are collected and readings from the State geological reports and other literature of the science are made.

Required of Ph. B. students who elect the preceding course. It may be taken as an extra, by permission of the faculty, by A. B. and B. S. students who have taken the preceding course. Three hours weekly during third term.

8. Economic Geology. In this course, after a brief study of the principles of dynamic and structural geology, the work is related to the occurrence and distribution in the United States of building stones, mineral ores, coal and other economic products. Recitations, lectures and some laboratory work. Required of Seniors in the B. E. courses. Two hours weekly during the first term.

9. Honors. Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Physiology and Physical Training

DR. MC COMBER

Human Anatomy, Physiology, Hygiene and Physical Training are required in all courses. In the Freshman year the work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course covering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

During the fall term of the Sophomore year a course in Hygiene is given designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on "First Aid to the Injured," "Bacteriology," "Contagious and Infectious Diseases" and "Social Purity" form a part of the course.

It is the aim of the department to give the student such a training in the methods of Physical Education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of Freshmen only, but the organization of voluntary classes makes it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics at the end of the Winter term, credit being based upon

actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygienic data are furnished upon payment of a small fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical language and literature of the late Professor Tayler Lewis. The income from a bequest of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the "Thomson Alcove," is reserved for these books. By the will of the late Rev. Oscar Blakeslee Hitch-

cock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the College for the purchase of books, manuscripts, etc. A most important accession lately acquired is the "Croes Engineering Library," the gift of Mr. Edgar Beach Van Winkle of the class of 1860. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules

Hours 8-1; 2-6; 7-9 from Monday to Friday. 8-1; 7-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of $1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

Dr. D. S. Martin, Honorary Curator of the Wheatley Collection of Minerals.

The collections have recently been transferred to the third floor of Nott Memorial Hall. The opportunity has been used for

the re-inspection of all the material and for placing the collections in order with reference to their preservation and their educational use.

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the entire collection has been re-arranged and placed in order for exhibition and for study. It has also been enriched by additional specimens, some of them from the personal collection of Dr. Martin, now presented to the college, and others from the Brooks collection, a gift to the college from Mr. Alfred H. Brooks of the United States Geological Survey, in memory of his father, a graduate of the college, by whom the collection was made.

In Geology there is a general collection of rocks and minerals, and a considerable collection of Paleozoic and Mesozoic fossils. The collections made by the geological department under the direction of Professor C. S. Prosser so increased the museum that there is plenty of material now available, especially for the careful study of the Paleozoic rocks and fossils of the New York formations. These have recently been examined, re-arranged and placed in cases for exhibition by Dr. Martin.

In Zoology, the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the Eastern United States. These have recently been carefully inspected, and re-labelled. A considerable number of specimens of Porto Rican birds, collected and presented to the college by Mr. Byron W. Reed of the class of 1906, and mounted by Mr. John R. Nowell of the class of 1905 have been added. Of mammals there is a collection of 57 skins, the gift of the U. S. National Museum, and a number of skulls, skeletons and mounted specimens. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms, crustacea and mollusks, the total number

of species represented being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady County. The flora of the United States is further represented by collections from Virginia, the Red River region of the Southwest, and those made by Dr. Nevins in Alabama. The lower cryptogams are represented by a valuable collection of 2,300 specimens of fungi, the gift of Mr. J. B. Ellis, of the class of 1851. The Herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence, that of Engler and Prantl's Natürliche Pflanzenfamilien, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

The Museum is open to the public on Wednesday afternoon and Saturday morning. Visitors may be admitted at other times by making application to the college librarian.

CURRICULUM OF THE A. B. COURSE

	First Term	Second Term	Third Term
Freshman Year	4 Greek 4 Latin 3 French, or German 2 Rhetoric 4 Solid Geometry 1 Physiology Greek Prose Composition Latin Prose Composition	4 Greek 4 Latin 3 French, or German 2 Rhetoric 4 Algebra 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics	4 Greek 4 Latin 3 French, or German 2 Rhetoric 3 Trigonometry 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics
Sophomore Year	3 Greek 3 Latin 3 German, or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 1 Hygiene	3 Greek 3 Latin 3 German, or French 3 English and Rhetoric 2 History or Mathematics 3 Physics	3 Greek 3 Latin 3 German, or French 3 English and Rhetoric 2 History or Mathematics 3 Physics
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Sociology 13 Elective	1 Rhetoric 3 Sociology 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

Those entering Course A—see page 33, take French during Freshmen Year and German during Sophomore Year. Those entering Course B—see page 33. take two years of that modern language not offered for admission

For list of electives. see pages 77–80.

CURRICULUM OF THE PH. B. COURSE

	First Term	Second Term	Third Term
Freshman Year	4 Latin 3 German 3 French 2 Rhetoric 4 Solid Geometry 1 Physiology Latin Prose Composition	4 Latin 3 German 3 French 2 Rhetoric 4 Algebra 1 Physiology Latin Prose Composition 1 Gymnastics	4 Latin 3 German 3 French 2 Rhetoric 3 Trigonometry 1 Physiology 1 Gymnastics
Sophomore Year	3 Latin 3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 1 Hygiene	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry
Junior Year	3 English and Rhetoric 3 Logic 3 Biology 7 Elective	3 English and Rhetoric 3 Psychology 3 Biology 7 Elective	3 English and Rhetoric 3 Ethics 3 Biology 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Sociology 13 Elective	1 Rhetoric 3 Sociology 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

For list of electives, see pages 77–80.

CURRICULUM OF THE B. S. COURSE

	First Term	Second Term	Third Term
Freshman Year	3 French 3 German 2 Rhetoric 4 Algebra 3 Chemistry 1 Physiology	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics
Sophomore Year	3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology 1 Hygiene	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Sociology 13 Elective	1 Rhetoric 3 Sociology 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

For list of electives see pages 77–80.

LIST OF ELECTIVES FOR ALL COURSES

For limiting conditions, see statements of respective departments

Junior Groups

A total of seven hours is required.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

Group I

A. American History (3 hours) M., F., 8-9.
B. Solid Analytic Geometry, Differential Calculus[1] [2] (2 hours) W., F., 8-9.

Group II

A. Latin[1] [2] (2 hours) M., W., 9-10.

Group III

A. Argumentation (2 hours) Th., S., 9-10.
B. Shakespeare (1 hour) S., 9-10.

Group IV

A. French (3 hours) M., W., F., 10-11.
B. Anglo Saxon (2 hours) W., F., 10-11.

Group V

A. Spanish (3 hours) M., W., F., 3:30-4:30.
B. (a) Mathematical Physics (2 hours) M. W., 3:30-4:30.
   (b) Field Geology[3] (3 hours) F., 1:30-4:30.
   (c) Physical Laboratory (2 hours) M., W., 1:30-3:30.

[1]For A. B. Course
[2]For Ph. B. Course
[3]See statement of course

C. (a) Mathematical Physics (2 hours) M., W., 3:30-4:30.
(b) General Chemistry[1] (3 hours) T., Th., 11-12; F., 1:30-4:30.
(c) Physical Laboratory (2 hours) M., W., 1:30-3:30.

Group VI

A. Qualitative Analysis[2] (3 hours) T., Th., 1:30-4:30.
B. Quantitative Analysis[3] (3 hours) T., Th., 1:30-4:30.
C. (a) Greek[1] (2 hours) T., Th., 1:30-2:30.
(b) Medieval History (2 hours) T., Th., 2:30-3:30.

Group VII

A. Integral Calculus[3] (2 hours) T., Th., 11-12.

Group VIII

A. German (3 hours) T., Th., S., 10-11.

Group IX

A. General Geology, Astronomy, Evolution[2] (3 hours) M., W., F., 8-9.

Senior Groups

A total of thirteen hours is required.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

Group I

A. Morphology (3 hours) M., W., F., 9-11.
B. (a) European History (3 hours) M., W., F., 9-10.
(b) German (2 hours) M., F., 10-11.
(c) Greek[1] (2 hours) M., 11-12; W., 10-11.

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[1]For A. B. Course
[2]For Ph. B. Course
[3]For B. S. Course

C. (c) Differential Equations (2 hours) W., F., 9-10.
(b) German (2 hours) M., F., 10-11.
(c) Greek[1] (2 hours) M., 11-12; W., 10-11.

Group II

A. General Geology (3 hours) T., Th., 10-11; S., 9-10.
B. (a) Latin[1] [2] (2 hours) T., Th., 10-11.
(b) Shakespeare (1 hour) S., 9-10.

Group III

A. History of Philosophy (3 hours) T., Th., S., 11-12.
B. General Chemistry[1] (3 hours) T., Th., 11-12; F., 1:30-4:30.
C. Integral Calculus[1] [2] (2 hours) T., Th., 11-12.

Group IV

A. (a) Spanish[4] (3 hours) M., W., F., 3:30-4:30.
(b) History and Philosophy of Education (2 hours) M., W., 3:30-4:30.
B. (a) Mathematical Physics (2 hours) M., W., 3:30-4:30.
(b) General Chemistry[1] (3 hours) T., Th., 11-12; F., 1:30-4:30.

Group V

A. Physical Laboratory (2 hours) M., W., 1:30-3:30.
B. Spanish (2 hours) M., W., 2:30-3:30.
C. Advanced Argumentation (2 hours) W., 1:30-3:30.

Group VI

A. Qualitative Analysis[1] [2] (3 hours) T., Th., 1:30-4:30.
B. Quantitative Analysis[2] [3] (3 hours) T., Th., 1:30-4:30.
C. Organic Chemistry[3] (3 hours) T., Th., 1:30-4:30.

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[1]For A. B. Course.
[2]For Ph. B. Course.
[3]For B. S. Course
[4]For those who have not had Spanish in Junior year

D. (a) English Poetry (2 hours) T., Th., 1:30-2:30.
(b) French (2 hours) T., Th., 2:30-3:30.
(c) Medieval History (2 hours) T., Th., 3:30-4:30.

Group VII

A. Advanced Psychology, Advanced Ethics and Evolution of Religion (3 hours) M., W., F., 8-9.

Group VIII

A. Comparative Politics and International Law (2 hours) T., Th., 9-10.

THE ENGINEERING SCHOOL

Introductory. The charter of Union University brings together under one corporate name and administration Union College, located at Schenectady, N. Y., and the Law School, the Medical College, the Dudley Observatory and the College of Pharmacy, all located at Albany, N. Y.

The Engineering School forms a part of Union College. Its connection with the regular college courses and with the other members of the university group is considered an advantage, as it furnishes opportunities for general culture not usually available in a purely technical school.

Historical. When Union College was chartered, in February, 1795, the only American colleges west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of L'Ecole des Ponts et Chaussées, of Paris, France, where Prof. Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at its foundation it has never departed, although it has endeavored to keep pace with the development in American

technical education and with the increased demands on professional training. For many years Civil Engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies were discerned, a course in Sanitary Engineering, was established; and more recently a course in Electrical Engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River, and is intersected by several steam railroads, a number of interurban electric trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features may be mentioned the city grade-crossings improvement recently completed at a cost of a million dollars, and the city waterworks, which contain in their outfit a system of ground-water wells and a recently installed set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offer numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the Scientific Departments of the State Government at Albany, including the headquarters of the State Engineer's Department including also the new Barge Canal, and the Good Roads Division; the headquarters of the State Water

Supply Commission which includes also the State River Improvement work; the State Library; the Albany City Water Filtration Plant; at Troy the Burden Iron Works; the Gurley Engineering Instrument Manufactory; at Watervliet the United States Arsenal and Gun Factory; the Water Power Developments and Electric Power Transmission Plants at Mechanicville, Spier Falls and Johnsonville; the Hydraulic Cement Works at Glens Falls and at Howe's Cave; and the Modern Sewage Disposal Systems at Saratoga Springs and at Ballston Spa. The new barge canal will pass the Cohoes Falls by a flight of locks and will pass Schenectady by a system of locks and dams now under construction which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Sociology

OLIN H. LANDRETH, A. M., C. E., Sc. D.
Professor of Civil Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

SIDNEY G. ASHMORE, A. M., L. H. D.
Professor of the Latin Language and Literature

FRANK S. HOFFMAN, A. M., PH. D.
Professor of Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

JOHN W. HUGHES, B. S. in C. E.
Assistant Professor of Civil Engineering

OLIN J. FERGUSON, M. E. E.
Assistant Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

ERNST JULIUS BERG, Sc. D.
Consulting Professor in Electrical Engineering

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

JAMES H. CUNNINGHAM, B. E.
Instructor in Electrical Engineering

MORLAND KING, B. E., M. E. E.
Instructor in Electrical Engineering

OSCAR VON VOIGTLANDER, M. E.
Instructor in Civil Engineering

ALBERT S. EASTMAN, B. S.
Instructor in Chemistry

HORATIO M. POLLOCK, PH. D.
Instructor in History and Sociology

JOHN A. C. CALLAN, B. S. in C. E.
Instructor in Engineering Drawing

HAROLD C. MITCHELL, S. B.
Instructor in Engineering

HARRY B. STOVER, B. A.
Instructor in Modern Languages

EUGENE F. PARKER, M. A.
Instructor in Modern Languages

ROBERT M. MARK, B. A.
Instructor in Engineering Mathematics

M. F. WESTOVER
Lecturer on Organization and Management of Corporations

J. L. R. HAYDEN
Lecturer on Arc Lighting and Photometry and
Supervisor of Electr. Eng. Thesis work

COURSES OF STUDY

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies, to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Undergraduate Courses. Four undergraduate courses of study in engineering are offered, three extending through four years and one extending through six years:—(1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last two years, while the electrical course in its last two

years differs widely from the other courses. The degree of Bachelor of Engineering (B. E.) is given for the successful completion of any one of the above three courses.

A six-year course in general engineering is also offered comprising the above four-year course in general engineering, course (1), and the regular four-year Latin-scientific course of the Academic Department, with the subjects of the two courses properly interwoven during each term. The course thus offers a combined college and technical training with the subjects of the two properly correlated. The degrees of Bachelor of Engineering (B. E.) and of Bachelor of Philosophy (Ph. B.) are given on the satisfactory completion of this course.

Graduate Courses. In addition to the above undergraduate courses in engineering, two graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M.C. E.) and of Master of Electrical Engineering (M. E. E.) are given on the satisfactory completion of one-year graduate courses of study in Civil Engineering and in Electrical Engineering, respectively.

REQUIREMENTS FOR ADMISSION

Common to all Engineering Courses

General Conditions for Admission. The general conditions governing admission to the Engineering School are stated in detail on page 36.

Requirements for Examination. Candidates for admission to the Freshman class in any of the engineering courses are required to pass satisfactory examinations in, or present approved certificates covering, the following subjects:

English Literature, Arithmetic, Algebra, Plane and Solid Geometry, Plane Trigonometry, Physics, German or French, History of the United States, Modern Geography, and Physiology, as given in detail on pages 38-42.

Candidates for admission to the Freshman class of the six-year undergraduate course are required, in addition, to pass a satisfactory examination or present approved certificates in Latin (3) page 40.

EXPENSES, TERMS AND VACATIONS

For information regarding expenses, terms and vacations, see pages 134-135 and page 25.

STUDIES OF THE FOUR COURSES

Outline Description. The following is an outline of those studies which in general are common to the three four-year courses in General, Sanitary, and Electrical Engineering and to the six-year General Engineering and Latin-Scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of General Studies and Technical Studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and laboratory work. Physical laboratory work is required of all engineering students. See also pages 62-64.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the Freshman and Sophomore years and laboratory work in qualitative analysis is continued through the first term of the Junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during the first and second terms of the Senior year. See also pages 64-66.

Astronomy. The instruction in astronomy includes physical astronomy, spherical astronomy and the theory of as-

tronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science. See also pages 66-68.

Geology (not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States. See also pages 66-68.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the Freshman year. In the first term a summary review of diction is given. In the second and third terms more attention is given to the development of thought by work upon kinds of composition and the paragraph. In the Sophomore year English Literature as represented by the work of the essayists and by Shakespeare is studied. In the Senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of Civil Engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects. See also pages 53-56.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the alternate language not offered. Some work in scientific French and scientific German is done during the latter part of the course. See also pages 47-52.

History and Economics. American history throughout the Junior year and economics during the first term of the Senior year are required of all engineering students.

Sociology, Political Science and International Law. General engineering students who elect "Option B" in engineering administration are required to have sociology during the last two terms of the Junior year, political science during the first two terms of the Senior year, and international law during the last term of the Senior year.

Physiology and Physical Training. See pages 69-70.

Studies of the Six-year Engineering and Latin-Scientific Course. For the studies of this course not described above, see the curriculum on pages 126-129 and the detailed descriptions as follows:—

For Latin, see page 46.
For English Literature, see page 53.
For Rhetoric, see page 54.
For History and Sociology, see page 56.
For Logic and Psychology, see page 58.
For Biology and Geology, see page 66.

Voluntary Studies. Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the Faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the General Engineering Department.

Mathematics. To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

The following courses are required:

Algebra, advanced, including elements of determinants. Required of Freshmen. Four hours weekly during first term.

Plane Trigonometry. Required of Freshmen in addition to the trigonometry required at entrance. One hour weekly during third term.

Spherical Trigonometry. Required of Juniors in the General Engineering Course "Option A," and in the Sanitary Engineering Course. Three hours per week during a part of the third term.

Analytic Geometry. Required of Freshmen. Four hours weekly during second term, and two hours weekly during third term.

Calculus. Differential and Integral Calculus. Three hours weekly during third term of Freshman year, three hours weekly during first and second terms, and two hours weekly during third term of Sophomore year.

Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics and pneumatics. These studies form the foundation for the technical studies of applied mechanics, strength of materials and stresses

in framed structures, all of which are fundamental to one of the chief divisions of an engineer's duties, namely, that of designing. Required of Sophomores. Three hours first term, two hours second term and one hour third term.

Drawing and Descriptive Geometry. The instruction in this work extends through the entire course. In the first term of the Freshman year the student is instructed in freehand drawing and in freehand lettering. In the second term he is instructed in the use of drawing instruments, in orthographic projections and in construction of geometrical problems and instrumental lettering. In the third term Freshman and first term Sophomore he is given practice in plotting surveys made in the field. Further instruction in topographical drawing follows in the first term of the Sophomore year. Descriptive geometry is begun in the second term Sophomore and, in addition to instruction in the theory, some of the most common applications in practice are taught by the use of practical problems. Schroeder's models and the Olivier models, as well as the models of intersections of the Paris Polytechnic School, are freely used. In the third term Sophomore instruction is given in shades, shadows and perspective and in the theories of oblique projections.

Mensuration and Surveying. This work is begun in the second term of the Freshman year by the study of pure and applied mensuration, together with the fundamental principles of error, precision and computations, illustrated by practice. In the third term the theory of surveying instruments and operations is taken up and illustrated by field practice with the chain, tape, compass, transit, level and rod. In the third term Sophomores topographical surveying is commenced and instruction and practice are given in the use of the various methods and instruments.

As a preliminary to instruction in each branch of surveying a thorough study of the instruments employed is made, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. The

classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field surveys.

Applied Mechanics and Materials. Applied mechanics is commenced in the first term of the Junior year, and comprises the extension of analytical mechanics and the development of the methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

In conjunction with this work is given the study of the production, preparation, strength and physical properties of the various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel. Practice in the engineering laboratory is an important adjunct to this study.

This entire division, properly correlated, becomes the foundation of all rational engineering design and construction.

Engineering Law and Procedure. During the first and second terms of the Freshman year and the third term of the Senior year a series of lectures is given on topics pertaining to the training and the qualifications of engineers, and to engineering practice. In the Junior and Senior years in "Option B," and in the third term of the Senior year of "Option A," a course is given in the study of the elements of the law and principles of procedure in contracts, agency, corporations, commercial and financial transactions and industrial accounting and of the law relating to land boundaries and titles, water courses and surveys.

Final Examinations. During the Senior year a series of final examinations will be held covering the more important subjects of the entire course. The list of subjects in which examinations are to be given during any term will be determined by the faculty.

Theses. Each candidate for graduation is required to present on or before the last Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of Civil Engineering or of Electrical Engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Reviews or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted for approval not later than November preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress.

Library

The College Library contains the Engineering and Scientific Library of the late Professor Gillespie and other valuable technical collections. See page 70.

GENERAL ENGINEERING DEPARTMENT

Two Alternate Courses. In the four-year general engineering course two alternate courses or options are offered, either of which may be selected by general engineering students at the beginning of the Junior year, and each of which extends through the Junior and Senior years. The first of these alternate courses, designated as "Option A," offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession. The other alternate course,

designated as "Option B," while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this alternate course is to offer to engineering students an opportunity better to qualify themselves for engineering positions of an executive or administrative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found later on pages 122, 123, 128, 129.

In addition to the studies common to all engineering courses previously described on pages 88-95, the following subjects are included in the general engineering course. Unless otherwise stated, the following studies are required in each of the two alternate courses in General Engineering:

Drawing and Descriptive Geometry (continued). In the Junior year work in drawing includes machine drawing and the solution of problems in graphical analysis. In the Senior year the subject includes the work in engineering design and construction of the last two terms, and comprises a large amount of structural drawing in the development of the designs of engineering structures. A course in stereotomy and stone cutting is given in the first term Senior, with drawings from the stereotomy models of the Paris Polytechnic School. Practice in blue printing is made a part of these courses.

Surveying (continued). Railroad surveying is treated in the third term of the Junior year, and the students are given exercises in the proper field operations on railroad surveys, office and field location and staking out work for construction. The subject of railroad construction and equipment is not treated until the first term of the Senior year.

Field and Laboratory Practice. In addition to the weekly field and laboratory exercises throughout the year, all Freshman, Sophomore and General Junior engineering students will be given an uninterrupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course will begin on the day (Thursday) following Commencement and will continue through that and the two following weeks. The work will be so selected and arranged as not only to supplement the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. The practice will form a part of the spring term work.

Astronomy. A short course in Descriptive and Mathematical Astronomy, occupying, with some preliminary work in Spherical Trigonometry, three hours during the spring term of the Junior year.

Least Squares, Geodesy and Field Astronomy. This course is given three hours weekly, during the second and third terms of the Senior year. After a study of the fundamental principles of the adjustment of errors and their use in finding the weights and probable errors and in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up, accompanied by field work which also includes the determination of time, latitude, and azimuth, with ordinary instruments and with methods and instruments of an observatory.

Engineering Design. The course in applied mechanics and materials prepares the student to undertake the study of engineering design proper, which is pursued throughout the Senior year; an important feature of this course is the work in bridges, railroads and water-power developments, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and

conditions, the preliminary study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class.

Water. The subject of water is considered from several standpoints. In the first term Junior is given a laboratory course in chemistry, followed by a course in water analysis. In the third term Junior is given a course in hydraulics, followed in the Senior year by a fuller development of the subject as applied to rainfall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines. The new laboratory affords opportunity for experimental work on flow of waters through orifices and pipes, and for tests of pumps, etc.

Highways. The study of highways in the first term of the Junior year comprises a consideration of the highway as an element in the transportation system of the State, the principles of its economic location and proper construction, a study of the various modes of construction and the materials employed, its proper maintenance and systems of highway laws and administration.

As a preliminary to the study of highway location as well as of railroad and route surveying, some consideration is given to the principles and fundamental laws of topographical types and forms and their relation to the various modes of earth sculpture.

Streets and Pavements. A study of the methods of laying out and grading streets and pavements and of the various

street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects, is also given during the first term of the Junior year.

Motors and Motive Power. Following the work in thermodynamics and hydraulics of the third term of the Junior year an outline course in motors and motive power is given in the first and second terms of the Senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines, gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity. The new laboratory affords opportunity for efficiency tests of hydraulic and other forms of motors.

Electrical Machinery and Transmission. Following the instruction in electricity in the Department of Physics, General Engineering students are given, during the second term of the Junior year, a three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments.

Principles of Finance, Business, Accounting. General engineering students who elect "Option B" are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping during the second and third terms of the Senior year.

Equipment

General Engineering Building

The new Engineering Building will soon be completed, and will be occupied by the General Engineering Department. It is a handsome structure of modern design, built of gray and buff pressed brick with gray stone trimmings.

The building is of fireproof construction throughout, the only wood used being in the doors, windows, and floor surface. It

covers an area of 67 x 137 ft. and is three stories in height, with a basement above the ground level, making it practically four stories.

The entire East end of the basement, 50 x 62 ft. in area, will be used as a hydraulic laboratory. It is equipped with a steel tank 5 ft. in diameter and 52 ft. high, extending to the roof, with a tight cover so that it can be used as either a gravity or a pressure tank. The base of the tank will be provided with connections for standard orifices of various sizes and shapes. Connections will also be provided so that turbines and other forms of water motors can be driven by water from the tank under different heads. This room also contains a concrete canal 5 ft. deep, 9 ft. wide and about 20 ft. long, which will be extended out of doors to a total length of 100 ft. It will be arranged for the insertion of temporary dams at different points along its length, so that weirs may be used for the measurement of large flows of water. It is also to be used as a large measuring tank in connection with pump tests, and for various other hydraulic experimental purposes.

In the Southwest corner of the basement is the Cement laboratory, 46 x 26 ft. in area, equipped for the testing of cement, concrete, and similar structural materials.

The basement also contains a locker room, with 50 individual lockers for the use of students when working in the laboratories; and there is also a large and well-ventilated toilet room.

The Northwest corner of the basement is taken up by a room for surveying instruments, with lockers, etc., for issuing equipment to field parties. Ready access is obtained to this room by an outside entrance at the West end of the basement corridor. This instrument room is connected by a lift with a large instrument laboratory on the first floor, which will also be furnished and used as a computing room by surveying classes.

On the first floor, besides the large computing room just mentioned, there is a large office and a room for the use of the Engineering faculty.

In the Southeast corner is an Engineering Museum, where models of bridges and other engineering structures will be placed, so as to be accessible for inspection.

The Museum will be connected by sliding doors with the Engineering Library and Reading Room. Here will be placed the valuable Croes library recently donated to the Department by E. B. Van Winkle of the Class of 1860, and also the large collection of engineering drawings, etc., belonging to the Department.

The first floor also contains two recitation rooms, and one drawing room for the use of the class in Engineering Design.

On the second floor the North half is taken up by two large Lecture or Society Rooms, each of which can be divided by folding partitions into two recitation rooms of the usual size. The South half of this floor is taken up by the Applied Mechanics Laboratory, 40 x 25 ft. and one large and one small recitation room. In the Southeast corner is the Sanitary Engineering Laboratory.

On the third floor are two large Drawing Rooms, each about 24 x 60 ft., and three smaller drawing rooms. All of these rooms are well lighted by windows and sky lights. On this floor is also a good-sized blue-print room, a photographic room, and a dark room.

Each floor contains two or more small private offices for the use of Instructors; and the entire plan of the building is admirably adapted to the needs of the Department.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, prismatic compasses, Burnier's compass, solar compass, Y levels, plane tables, sextants, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the Engineering School.

The collection of models in Descriptive Geometry and Stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models, representing the most important and complicated ruled surfaces of Descriptive Geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the generatrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while Professor of Descriptive Geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory of Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading *"Inventé par Théodore Olivier,"* etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own words being, *"Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité."*

Professor Bardin's (Paris) plaster models (seventy) of the INTERSECTIONS of prisms, pyramids, cylinders, cones, etc.

Schroeder's (Darmstadt) models (twenty) of elementary DESCRIPTIVE GEOMETRY. The planes of projection are in wood, and the lines and surfaces in metal; models illustrating Shades and Shadows.

Stone Cutting Models (twenty) in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of OBLIQUE ARCHES.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique light; models and maps in colored topography; a large model of Mount Cenis Pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of Architecture from L'Ecole des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbro.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doyne's Dynamometer Bridge Models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in Physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are, without exception, open at all times to the students. They furnish an admirable means of practical illustration in Mineralogy. Among the rare and valuable specimens are those of Anglesite, Cerusite, Mimetite and Calcuprite, which in American specimens are equaled only by those in the British Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The College possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been arranged to illustrate their mode of occurrence and geographical distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.; also suites of specimens of wood, charcoal, mineral coal,

peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and of some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collections of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of municipal public works and of systems of water supply, sewerage and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering differs from the general engineering course by omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical laboratory work.

Sanitary Conditions of Buildings. In the first and third term Senior, respectively, are given courses in heating and ventilation and in house drainage and plumbing. The latter course will give special attention to the matter of water supply and of the removal of wastes from buildings in all situations, from the isolated country house to that in a thoroughly drained city.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the Senior year. The fundamental sanitary and constructive principles will be developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. A course of lectures in the third term Senior presents the principles upon which the laws touching the subject of the public health are based and the outlying principles which should govern the preparation of sanitary codes and regulations.

Graduate Course
in
General or Sanitary Engineering
Leading to the Degree of M. C. E.

This course of one year's graduate study, consisting of lectures, laboratory and research work is open to graduates of the General or the Sanitary Engineering Course of Union College or of any other institution of a standing recognized by the Faculty.

Correspondence regarding admission to the undergraduate courses should be addressed to the Secretary of the Faculty. Correspondence regarding admission to the graduate course in Civil Engineering may be addressed to

OLIN H. LANDRETH
Professor of Civil Engineering
Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in Electrical Engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company.

The course of studies offered by the Department of Electrical Engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefore, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in Electrical Engineering, which, while it enables the student, after graduation, to enter the field of Electrical Engineering practice in the manufacturing or operating company or consulting engineer's office in a subordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts—that is, aims at quality, and not quantity—and as far as possible in all engineering instruction the sub-

ject is brought before the students in three different ways; by a theoretical lecture course with recitations, practical instruction in the electrical laboratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design in the drafting room. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating thesis. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the College authorities and the officials of the company by which the students in the Junior and Senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the Junior year, however, the courses diverge. The electrical engineers take up a number of mechanical en-

gineering subjects and continue them throughout the Junior and first part of the Senior year. In fact, during the Junior year the mechanical engineering work may be considered as constituting the major subject, though a considerable amount of time is also devoted to electrical engineering.

Studies also required in other courses are:

3. **American History,** see page 56.
3. **Rhetoric,** see page 54.
2. **Analytic Chemistry,** see page 64.
   Natural Perspective
6. **Economics,** see page 57.
   Engineering Law and Procedure, see page 94.

The mechanical engineering subjects not previously described are:

M.E.1, Hydraulics. First term, Hydraulics and hydraulic machinery; second term, Hydraulic turbine design. Mr. CUNNINGHAM.

M.E.2. Steam Engines. Second term, Theory of the steam engine; third term, Steam engine design. Mr. KING.

M.E.3. Thermodynamics, Gas Engine and Steam Turbine. First term, Asst. Prof. FERGUSON.

Other general subjects given only to electrical engineering students are:

C.E.1. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession. Third term.

Seminar. Beginning with the Junior year one hour per week is given in mathematical seminar. Practical engineering problems are proposed, in the solution of which it is necessary to utilize the field of mathematics previously covered. Mechanics, thermodynamics, hydraulics, electrical phenomena of permanent or transient form—all combine to make an in-

exhaustible field from which graded problems are selected. This is the practical application of Algebra, Trigonometry, Calculus, etc.

The Senior year continues these exercises with problems constantly increasing in difficulty. Asst. Prof. FERGUSON.

The electrical engineering studies include the following:

E.E.1. Engineering Mathematics. One lecture a week is given throughout the Junior year on the special branches of mathematics most employed in engineering work. It is recognized that mathematics is the foundation of all engineering, and a considerable part of the Freshman and Sophomore years is therefore devoted to the study of mathematics. In addition thereto this course is given specially to train the students in those particular branches of mathematics which are most frequently applied in electrical engineering, and so enable them to handle mathematics as a ready working tool in practical engineering problems. This course covers complex quantities; the infinite series, its derivation and meaning; the trigonometric series; determination of maxima and minima; the fundamental differential equation of electrical engineering and its integral; empirical curves and their investigation, as the parabolic, exponential and logarithmic function. First, second and third terms, Dr. STEINMETZ, Mr. CUNNINGHAM.

E.E.2. Direct Current Circuits and Apparatus. Students in electrical engineering devote a considerable part of the Junior year to the study of the fundamental principles of the subject. Direct current phenomena are studied first, as this part of the subject is somewhat simpler and is readily brought within the grasp of the average student. This work includes the theory and practice of direct current generators and motors and auxiliary apparatus, taking into account also the principles of design. First and second terms, Mr. KING.

Alternating Current Circuits and Apparatus

E.E.3. *Junior.* Fundamentals of alternating current circuits and machines. Many problems are assigned in order to make the

work specific and concrete. Second and third terms, Mr. CUNNINGHAM.

E.E.4. *Senior.* A continuation of E.E.3, becoming more advanced. Analyses and discussions of generators, synchronous motors, transformers, induction motors, series motors, convertors, higher harmonies, etc. First and second terms, Asst. Prof. FERGUSON.

Electrical Laboratory

E.E.5. Direct Current Laboratory. The work under this head is parallel with E.E.2, and includes all standard tests of direct current machines, and is supplemented by numerous experiments arranged with due regard to their general importance and scientific value. The machines with which the student has become more or less familiar in class work are here examined in detail and careful records made of efficiency, regulation, internal characteristics, commutation under varying loads, etc. First and second terms, Mr. CUNNINGHAM.

E.E.6. Alternating Current, *Junior.* The work done here in the Junior year consists of an extensive series of experiments corroborating and explaining the theories of the lecture room. The exercises consist in investigation of voltage and current conditions on a variety of combinations of resistance, inductance and capacity in series and in multiple, the exploring of field flux and wave shapes of alternators, and the effect of inductance and capacity on wave shape, the use and calibration of meters, the potentiometer, the photometer, etc. Upon entering the Senior year the student is thus equipped with the broad foundation in the underlying principles of electrical engineering, which is absolutely essential to a comprehensive study of the more intricate and special departments of the subject. Third term, Mr. CUNNINGHAM.

E.E.7. Alternating Current, *Senior.* In this course, complete tests are made on the apparatus studied, and the characteristics of the various machines are determined. The laboratory work deals with the transformer: ratio, im-

pedance and coreloss characteristic, regulation and heat runs, the synchronous motor and generator: amplitude and phase displacement of the various phases of multiphase machines, no load and load saturation, phase characteristics, pulsation, regulation and compounding curves, starting test, etc., the induction motor: determination and plotting of curves for power factor, speed, slip, torque, efficiency as function of speed, starting tests on motors with squirrel cage armatures and compensator, also on machines with variable rotor resistance, impedance and coreloss curves and maximum output determination, the single phase induction motor, the use of the oscillograph, etc. First and second terms, Mr. CUNNINGHAM.

Electrical Apparatus Design

E.E.8. Direct Current Machines. When E.E.2 has been finished each student is directed to design a specified machine and is required to do this work in class and without other aid than that given by the instructor. Complete calculations, with curves, where necessary, and working drawings of the machine designed, are required, and credit is given for accuracy, originality and neatness. Third term, Mr. KING.

E.E.9. Alternating Current Machines. This subject is a continuation throughout the Senior year of the Machine Design begun during the Junior year, and the two are handled in much the same manner. Transformers, induction motors, alternating current generators, etc., are calculated and their layouts completed. As each type of machine is taken up, fundamental lectures are first given, outlining the requirements for successful construction and operation and supplying data for all computations. Individual work is then assigned to each student and is carried out under the personal supervision of the instructor. First, second and third terms, Asst. Prof. FERGUSON.

E.E.11. Electric Lighting. Wiring, systems of distribution and their comparative economy and efficiency, standard

types of incandescent lamps and arc lamps, recent developments in these lines, vacuum tube lamps, the arc, photometry, illuminating engineering, etc. Third term, Asst. Prof. FERGUSON.

E.E.12. Technical Literature. For the engineer ordinarily to neglect technical literature of the day is to live in the past. In this course, students are required to report in class upon certain English, German, French or American publications assigned to them, reviewing briefly the best articles found in current numbers. There are also included library references to biographical sketches and research works of eminent men.

It is intended by this means that the student shall become broadly familiar with the sources of the best and the most recent technical literature; that he shall learn how to keep abreast of the times; that he shall acquaint himself with channels through which he may obtain information upon any particular subjects; that he shall be able to summarize any article he reads, picking out its salient points; that he shall receive practice in expressing his thoughts clearly and concisely upon important subjects. First, second and third terms, Asst. Prof. FERGUSON.

E.E.13. Electrochemistry. Theory of solutions, osmotic pressure, dissociation, concentrations, electrical processes of manufacture of commercial chemicals, electric furnaces, etc. This subject is daily becoming of greater importance. Second term, Mr. KING.

E.E.14. Electric Transmission. The subjects discussed here are long-distance transmission, line construction, systems, grouping of machines, control of phase, methods of compensation, maximum power supplied over line, line efficiency, copper efficiency, distributed capacity, inductance, resistance, leakage and natural period of transmission line, surging, resonance due to higher harmonics, balanced and unbalanced polyphase systems, transformations, lightning, lightning protection. First, second and third terms, Mr. KING.

E.E.15. Electric Railways. The subject of electric railway engineering is treated in three sections: 1. From the point of view of the consulting engineer who, being retained by the promoters of a proposed railway, investigates the field and territory of the new line, advises as to probable earnings of line, lays route, prepares plans and specifications and has charge of construction. · 2. From the point of view of the operating engineers who have charge of rolling stock and maintenance of service on the line. This includes a complete discussion of the equipment of modern electric railways, the various systems in vogue, sub-station equipment and in general the operation of electric railways. 3. The problem of the electric railway as it is presented to the designing electrical engineer is discussed. About half of the time devoted to railways is reserved for this section of the work. The questions of predetermination of railway motors from service characteristics, of train resistance and other quantities affecting the operation of electric trains are treated and the various alternating current railway motors which are being developed are discussed. The experimental railroad operated by the General Electric Company in Schenectady is a valuable auxiliary in this course. Second and third terms, Asst. Prof. FERGUSON.

E.E.17. Electrical Engineering Practice. This course of lectures is designed to put the student into touch with the most recent developments of advanced engineering practice. It emphasizes the fact that an engineer must be well equipped and resourceful in order successfully to attack new problems. It is an outgrowth of what was formerly known as a Lecture Course by Specialists. Second and third terms, Mr. BERG.

E.E.18. Electrical Engineering Theory. Beneath the whole superstructure of Electrical Engineering is one broad base. This foundation is the same for alternating currents, or direct currents; motors or generators; power circuits or telephone circuits; local distribution or long distance transmission, permanent phenomena or transient phenomena. These courses of lectures lead to a better conception of relations existing among

the seemingly, widely separated branches of the applied science and furnish foundation and incentive for subsequent advanced work. First, second and third terms, Prof. STEINMETZ and Asst. Prof. FERGUSON.

E.E.19. Thesis. (See page 95.) First, second and third terms.

Lectures by Engineers. To Juniors and Seniors of this course is available the notable privilege of becoming, upon the payment of a nominal fee, members of the Schenectady Section of the American Institute of Electrical Engineers. Throughout the winter occur, before this Section, a succession of lectures probably without an equal except before the national body itself. The value of this course cannot be overestimated.

A partial list of the speakers of the past season is added:

Prof. W. S. FRANKLIN	Prof. E. E. F. CREIGHTON
D. B. RUSHMORE	PERCY THOMAS
W. S. ANDREWS	Dr. S. A. MOSS
Prof. ELIHU THOMSON	E. B. MERRIAM
E. J. BERG	G. H. HILL
Dr. CHARLES P. STEINMETZ	H. W. TOBEY
C. E. EVELETH	Dr. E. W. RICE

Electrical Laboratory Equipment

The Electrical Engineering Laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the building is T-shaped. The upper bar of the T has two stories. The lower floor is devoted to three laboratory rooms, the largest of which is 101 ft. by 35 ft. outside dimensions. This is the main laboratory and extends from front to rear of the building.

A light well-ventilated drafting room occupies the major portion of the second floor, being 73 ft. by 27 ft. in dimensions.

The purpose of a college laboratory of Electrical Engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the Electrical Engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the Works and Testing Department of the General Electric Company under the direction of the college instructors, which trips constitute an integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A direct connected unit consisting of a Westinghouse Gas Engine and a direct current generator; a motor-generator set consisting of a 17.5 K.W. direct current generator direct connected to a three-phase 220 volt induction motor; connection with the 550 volt direct current trolley circuit of the Schenectady Railway Company; connection with the three-phase 2300 volt power circuit of the Schenectady Illuminating Company. In the latter case

voltage is reduced by banks of step down transformers, so that the students can handle the safe low tension circuits only.

A secondary supply is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

A very large number of various sizes of transformers are provided to give the students practical experience in connecting transformers for different ratios and for transformation between three-phase, quarter-phase, six-phase, etc., systems. The equipment further contains three-phase, quarter-phase and six-phase alternators and synchronous motors, the two characteristic types of induction motors, three and six-phase rotary converters, bipolar and multipolar generators, and numerous smaller induction motors, converters and direct current motors and generators of different types. A constant current arc machine, with different types of arc lamps and a constant alternating current transformer, with series arc lamps, testing tables, switchboards and numerous instruments of the indicating and the integrating type, are also provided for efficient instruction.

Among the recent additions to the laboratory are an oscillograph and a potentiometer. The former is the standard three galvanometer type, manufactured by the General Electric Company, with photographic and tracing attachments. With this instrument wave forms may be traced or photographically recorded and transient phenomena of the electric circuit studied and investigated. The potentiometer is an absolute standard for the calibration of electrical instruments and is similar to that used by the Public Service Commission of New York State.

Graduate Course

Leading to the Degree of M. E. E.

To those students who, after graduating from the four-year Electrical Engineering course, desire to increase their knowledge a Graduate course of one year is offered in which, besides instruction in higher branches of Electrical Engineering, there will be occasion to carry out original investigations under

the supervision and with the assistance of specialists prominent in Electrical Engineering practice on subjects closely connected with the most recent advance of Electrical Engineering. In return for the assistance offered to the Graduate students in their research work by prominent specialists such students may be required to devote a small part of their time to assisting the regular college instructors in laboratory instruction. This course leads to the degree of Master of Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the Faculty.

The options open to Union College graduates are:

1. Three terms' work in residence.

For this course registration is required at the College Office for the three terms.

2. One half year of engineering work with the General Electric Company, supervised by the Electrical Engineering Department of the college, and two terms of college work in residence.

For this course registration is required with the Electrical Engineering Department before entering upon any accredited work, and at the College Office for the two terms preceding the granting of the degree.

3. At least one and one-half years of engineering work with the General Electric Company, supervised by the Electrical Engineering Department of the college, and a thesis representing a distinct advance in the science.

For this course registration is required with the Electrical Engineering Department eighteen months before granting of the degree and at the College Office for one term preceding the granting of the degree.

Graduates of other colleges must register at the College Office for the full year preceding the granting of the degree. The course may be arranged, at the discretion of the department, to include a greater or lesser amount of work with the General Electric Company.

Some of the subjects offered to the graduate students are:

Advanced Calculus.

Differential Equations

Long Distance Transmission

Design and Control of Electric Power Systems of Very Great Magnitude

Electric Railway and Traction,. continued

Modern Theory of Electrical Engineering, continued

Oscillating Currents and High Frequency Phenomena

Transient Phenomena

Lightning and Lightning Protection

Wave Transmission, with Special Application to Telephony

Scientific Foundations of Electrical Engineering

Electro-Chemistry

Chemistry of Very High Temperature

Light and Illumination

Laboratory

Research Work

Some of the lectures given by Professor Charles P. Steinmetz to Graduate students are as follows:

Review: The Electric, Magnetic and Dielectric Circuit. Resistance, Inductance, Capacity and Wireless Telegraphy.

The Law of Electromagnetic Induction; Electric Apparatus and Machines.

The Characteristic Curves of Electrical Apparatus, Machines and Circuits, Magnetic Characteristic: Saturation and Excitation Curve. Load Characteristic: Regulation Curve, Field Characteristic, Compounding Curve. Phase Characteristic of Alternating Current Apparatus; Efficiency, No Load and Load Losses.

Commutating Machines: Direct Current Generators and Motors.

Synchronous Machines: Alternators and Synchronous Motors and Converters.

Induction Machines: Induction Motors and Generators, Single Phase and Polyphase Repulsion Motors and Generators.

Rectifying Machines: The Arc Machine, Constant Potential and Constant Current Rectification, Arc Rectifiers, and Electrolytic Rectifiers.

Transformers and Reactors: Constant Potential and Constant Current.

Meters. Indicating, Integrating and Recording.

Transient Phenomena: Starting and Building Up of Direct Current Generators; Effect of Field Inductance and Fluctuating Load. Starting of Synchronous Machines.

Starting of Transformers, of Inductive Circuits, of Circuits containing Inductance and Capacity, Transmission Lines, Short Circuit Phenomena of Circuits containing Inductance and Capacity. Transmission Lines, Short Circuit Oscillations.

Short Circuit Current of Direct and Alternating Current Generators.

Hunting or Surging of Synchronous Machines, Motors and Converters. Hunting or Surging of Induction Machines, of Direct Current Motors and Generators.

Alternating Current Series Motors.

In addition to this a course is given on the design of electrical apparatus, in which the students carry out the design of a number of typical machines and apparatus under the personal direction of Professor Steinmetz; and the course includes the discussion of all the elements entering into the practical design and construction.

Correspondence regarding admission to the undergraduate courses should be addressed to the Secretary of the Faculty. Correspondence regarding admission to the graduate course in Electrical Engineering may be addressed to

CHARLES P. STEINMETZ
Professor of Electrical Engineering
Schenectady, New York

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING

	First Term	Second Term	Third Term
Freshman Year	3 French 3 German 2 Rhetoric 3 Freehand Drawing 4 Algebra 1 Physiology Lectures	3 French 3 German 2 Rhetoric 4 Analytic Geometry 2 Mensuration 3 Mechanical Drawing 1 Gymnastics Lectures	3 French 3 German 2 Rhetoric 2 Calculus 3 Analytic Geometry 2 Surveying and Plotting 1 Trigonometry 1 Physiology Field and Laboratory Work, following Commencement Summer vacation Work
Sophomore Year	1 Rhetoric 3 Calculus 4 Mechanics 3 Physics 3 Chemistry 3 English Literature 1 Hygiene	1 Rhetoric 3 Calculus 2 Mechanics 4 Physics 4 Chemistry 2 English Literature 3 Descriptive Geometry	1 Rhetoric 2 Calculus 1 Mechanics 4 Physics 4 Chemistry 3 Topographical Surveying 3 Descriptive Geometry; Shades and Shadows Field and Laboratory Work, following Commencement. Summer Vacation Work

The figure at the left indicates the number of hours per week devoted to class work in the subject.

The Freshman and Sophomore years are identical in the General, Sanitary and Electrical Engineering courses.

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 4 Applied Mechanics 3 Chemical Laboratory 4 Highways and Pavements 3 Topographical Surveying and Mapping	1 Rhetoric 2 American History 5 Mechanics of Materials and Eng. Laboratory 3 Kinematics Machine Drawing 3 Electricity 2 Thermodynamics 1 Natural Perspective	1 Rhetoric 2 Amer. Hist. 4 Stresses and Graph. Analysis 3 Hydraulics 3 Route Surv- 3 Spher. Trigonometry and Astronomy 2 Stereotomy Inspection Trips Field and Laboratory Work following Commencement Summer Vacation Work
Senior Year	3 Economics 5 Railroad and Trolley Road Construction 4 Engineering Stresses 2 Economic Geology 2 Motors and Motive Power 2 Outlines of Architecture One Literary Essay One Technical Essay Inspection Trips	2 Sanitary Biology 3 Method of Least Squares 4 Engineering Design and Construction 2 Water Supply Engineering 3 Motors and Motive Power 2 Building Construction One Literary Essay One Technical Essay	3 Engineering Law and Procedure 3 Geodesy and Field Astronomy 5 Engineering Design and Construction 5 Water Supply Sewerage and Sewage Disposal Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING, OPTION B

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 2 English History 4 Applied Mechanics 4 Highways and Pavements 3 Chemical Laboratory 3 Topographical Surveying and Mapping	1 Rhetoric 2 American History 2 English History 3 Elements of Law 5 Mechanics of Materials and Eng. Laboratory 3 Electrical Machinery 2 Thermodynamics	1 Rhetoric 2 Amer. Hist. 2 French History 3 Law of Prop. and Cont. 4 Stresses and Graph. Analysis 3 Route Surv. 3 Hydraulics Inspection Trips Field and Laboratory Work, following Commencement Summer Vacation Work
Senior Year	3 Economics 2 Political Science 3 Principles and Law of Corporations 2 Motors and Motive Power 4 Engineering Stresses 2 Outlines of Architecture 2 Economic Geology One Literary Essay One Technical Essay Inspection Trips	3 Sociology 2 Political Science 2 Principles of Finance and Financial Operations 3 Motors and Motive Power 4 Engineering Design and Construction 2 Water Supply Engineering 2 Building Construction One Literary Essay One Technical Essay	3 Sociology 2 International Law 3 Principles of Administration 5 Engineering Design and Construction 3 Principles of Accounting Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE

SANITARY ENGINEERING

Freshman and Sophomore Years as in General Course, page 121.

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 4 Applied Mechanics 3 Chemical Laboratory 4 Highways and Pavements 3 Topographical Surveying and Mapping	1 Rhetoric 2 American History 5 Mechanics of Materials and Eng. Laboratory 3 Kinematics Machine Drawing 3 Electricity 2 Thermodynamics 1 Natural Perspective	1 Rhetoric 2 Amer. Hist. 4 Stresses and Graph. Analysis 3 Hydraulics 3 Route Surv. 3 Spher. Trig. and Astron. 2 Stereotomy Inspection Trips Field and Laboratory Work following Commencement Summer Vacation Work
Senior Year	2 Motors and Motive Power 4 Engineering Stresses 3 Heating and Ventilation 3 Chemical Laboratory 2 Economic Geology 3 Economics One Literary Essay One Technical Essay Inspection Trips	3 Motors and Motive Power 4 Engineering Design and Construction 2 Water Supply Engineering 2 Chemical Laboratory 2 Sanitary Biology 3 Electives[2] One Literary Essay One Technical Essay Inspection Trips	3 Engineering Law and Procedure 5 Engineering Design and Construction 5 Sewerage Sewage Disposal 1 House Draining and Plumbing 1 Sanitary Codes and Laws 2 Electives Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

The studies of the Junior year are identical with those of Option A in the General Engineering course.

CURRICULUM OF THE B. E. COURSE

ELECTRICAL ENGINEERING

Freshman and Sophomore Years as in General Course, page 121.

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric	1 Rhetoric	1 Rhetoric
	1 Seminar	1 Seminar	1 Seminar
	2 Amer. Hist.	2 Amer. Hist.	2 Amer. Hist.
	2 Elec. Lab.	2 Elec. Lab.	2 Elec. Lab.
	1 Mathematics	1 Mathematics	1 Mathematics
	3 Direct Current Circuit and Apparatus	3 Direct Current Circuit and Apparatus	2 Elect. Apparatus Design
	3 Hydraulics and Hydr. Mach.	2 Hydraulic Turbine Design	2 Elements of Civ. Eng.
	4 Applied Mechanics	3 Theory of Steam Engine	2 Steam Engine Design
		3 Altern. Cur. Circuits and Apparatus	3 Altern. Cur. Circuits and Apparatus
	3 Analytic Chemistry	1 Natural Perspective	3 Elec. Lighting Summer Vacation Work
Senior Year	3 Economics	2 Electro-Chem.	3 Engineering Law and Procedure
	2 Electrical Laboratory	2 Electrical Laboratory	2 El. Eng. Theory
	2 El. Eng. Theory	2 El. Eng. Theory	3 Transmission and Distrib.
	3 Transmission and Distrib.	3 Transmission and Distrib.	3 Elec. Apparatus Design
	2 Elec. Apparatus Design	3 Elec. Apparatus Design	1 Tech. Literature
	1 Tech. Literature	1 Tech. Literature	1 Seminar
	1 Seminar	1 Seminar	2 Elec. Eng. Practice
	3 Thermodyn. Gas Eng. and Steam Turb.	2 Elec. Eng. Practice	2 Elec. Ry.
	3 Altern. Cur. Circuits and Apparatus	2 Elec. Ry.	5 Thesis
	1 Thesis One Literary Essay One Technical Essay	3 Altern. Cur. Circuits and Apparatus	
		1 Thesis One Literary Essay One Technical Essay	

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING

Entrance requirements are the same as for General Engineering Course and Latin-Scientific Course

First Year	4 *Fr* Latin	*ls*	4 *Fr* Latin	*ls*	4 *Fr* Latin	*ls*	First Year
	3 *Fr* French or Germ.	*ls, e*	3 *Fr* French or Germ	*ls, e*	3 *Fr* French or German	*ls, e*	
	2 *Fr* Rhetoric	*ls, e*	2 *Fr* Rhetoric	*ls, e*	2 *Fr* Rhetoric	*ls, e*	
	4 *Fr* Algebra	*e*	4 *Fr* Anal. Geom.	*e*	2 *Fr* Anal. Geom.	*e*	
	3 *Fr* Free Hand Drawing	*e*	2 *Fr* Mensuration	*e*	3 *Fr* Calculus	*e*	
	1 *Fr* Physiology Lectures	*ls, e*	1 *Fr* Physiology	*ls*	1 *Fr* Physiology	*ls, e*	
			1 *Fr* Gymnasium Lectures	*ls, e*	2 *Fr* Surveying Summer Vacation Work	*e*	
Second Year	3 *So* Latin	*ls*	3 *So* Latin	*ls*	3 *So* Latin	*ls*	Second Year
	3 *Fr* Germ. or French	*ls, e*	3 *Fr* Germ. or French	*ls, e*	3 *Fr* German or French	*ls, e*	
	2 *So* English & Rhet.	*ls*	3 *So* English & Rhet.	*ls*	3 *So* English & Rhet.	*ls*	
	3 *So* Calculus	*e*	3 *So* Calculus	*e*	2 *So* Calculus	*e*	
	2 *So* Surveying	*e*	3 *So* Chemistry	*ls, e*	5 *So* Chemistry	*e*	
	3 *So* Chemistry	*ls, e*	3 *Fr* Mechanical Drawing	*e*	1 *Fr* Trigonometry	*e*	
	1 *So* Hygiene	*ls, e*			Summer Vacation Work		

	First Term	Second Term	Third Term	
Third Year	3 *So* Germ. or French *ls, e* 3 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *Jr* Chem. Lab'y *e* 2 *So* English Hist. *ls* 3 *So* Mechanics *e*	3 *So* Germ. or French *ls, e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* English Hist. *ls* 2 *So* Mechanics *e*	3 *So* German or French *ls, e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* French Hist. *ls* 1 *So* Mechanics *e* 3 *So* Topog. Surv. *e* Summer Vacation Work	Third Year
Fourth Year	4 *Jr* App. Mechanics *e* 5 *Jr* Topog. Surv. *e* 3 *Jr* Logic *ls* 3 *EJr* American Hist. *ls* 3 *Jr* Biology *ls*	5 *Jr* Mechs. of Mat. and Eng. Lab'y *e* 2 *Jr* Thermodyn's *e* 3 *Jr* Psychology *ls* 3 *EJr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *Jr* Nat. Perspec. *e* 1 *So* Elec. Lab'y *e*	4 *Jr* Stresses *e* 3 *Jr* Hydraulics *e* 3 *Jr* Ethics *ls* 3 *EJr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *So* Elec. Lab'y *e* Summer Vacation Work	Fourth Year

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Fr.*—Freshman work, *So.*—Sophomore work, *Jr.*—Junior work; *ls* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

Students offering French at entrance will take French during the first year and German during the second and third years; but students offering German at entrance will take German during the first and second years and French during the third year.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

After the completion of the fourth year, students in this course are given the choice of two optional courses A and B. The details of these optional courses are here given.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Fifth Year	3 *ESr* European Hist. *ls* 2 *ESr* Comparative Politics *ls* 3 *Sr* Economics *ls, e* 4 *Sr* Stresses *e* 2 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *EJr* Gen. Geology *ls*	3 *ESr* European Hist. *ls* 2 *ESr* Comparative Politics *ls* 3 *Sr* Sociology *ls* 3 *Jr* Kinematics and Machine Draw. *e* 3 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *Jr* Elect. Machinery *e*	3 *ESr* European Hist. *ls* 2 *ESr* Internat. Law *ls* 3 *Sr* Sociology *ls* 3 *Jr* Route Surv. *e* 3 *Jr* Spher. Trigon. and Astronomy *e* 1 *Sr* Rhetoric *ls* 2 *Jr* Stereotomy *e* Summer Vacation Work
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ. *e* 2 *Sr* Outlines of Architecture *e* 3 *Sr* Principles of Aesthet. Design 1 *Jr* Elements of Law *e* 2 *Sr* Econ. Geology *e* 3 *Jr* Highways and Pavements *e*	4 *Sr* Eng. Design *e* 2 *Sr* Water Supply *e* 2 *Sr* Build. Const'n *e* 2 *Jr* Elements of Law *e* 3 *Sr* Least Squares *e* 3 *Sr* Bacteriology	5 *Sr* Eng. Design *e* 5 *Sr* Water Supply and Sewerage *e* 3 *Jr* Law of Prop. and Contracts *e* 3 *Sr* Geodesy and Field Astron. *e* Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*—Junior work, *Sr.*—Senior work; *ls.* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING, OPTION B

	First Term		Second Term		Third Term	
Fifth Year	3 *ESr* European Hist.	*ls*	3 *ESr* European Hist.	*ls*	3 *ESr* European Hist.	*ls*
	2 *ESr* Comparative Politics	*ls*	2 *ESr* Comparative Politics	*ls*	2 *ESr* Internat. Law	*ls*
	3 *Sr* Economics	*ls, e*	3 *Sr* Sociology	*ls*	3 *Sr* Sociology	*ls*
	1 *Sr* Rhetoric	*ls*	1 *Sr* Rhetoric	*ls*	1 *Sr* Rhetoric	*ls*
	1 *Jr* Elements of Law	*e*	2 *Jr* Elements of Law	*e*	3 *Jr* Law of Prop. and Contracts	*e*
	4 *Sr* Stresses	*e*	3 *Jr* Elec. Machinery	*e*	3 *Jr* Route Survey	*e*
	2 *Sr* Econ. Geology	*e*	3 *Sr* Motors and Motive Power	*e*	2 *Jr* Stereotomy	*e*
	2 *Sr* Motors and Motive Power	*e*			Summer Vacation Work	
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ.	*e*	4 *Sr* Eng. Design	*e*	5 *Sr* Eng. Design	*e*
	3 *Sr* Prin. of Law of Corporations	*e*	4 Eng. Projects		5 *Sr* Water Supply and Sewerage	*e*
	2 *Sr* Outlines of Architecture	*e*	2 *Sr* Prin. of Finance and Financial Operations	*e*	3 *Sr* Principles of Accounting	*e*
	3 *Sr* Prin. of Aesthet Design		2 *Sr* Building Construction	*e*	3 *Sr* Principles of Administration	*e*
	3 *Jr* Highways and Pavements	*e*	2 *Sr* Water Supply	*e*	Thesis	
			3 *Sr* Bacteriology			

Fifth Year

Sixth Year

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*—Junior work, *Sr.*—Senior work; *ls.* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

ATTENDANCE AND STANDING

Registration. Every student must report at the Registrar's office at the beginning of each term and register college or local residence. Any change of residence during the term must be reported at once, in conformity with the regulation made by the Treasurer's office.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the Faculty.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept, and is transmitted at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the three highest marks for the whole course in the Engineering Department and the seven highest

marks in the other departments are entitled to appointment as Commencement Orators.

Absences in General. Absences are entered (in every course) against a student from the beginning of a term until he reports his return to the Registrar.

Absences are recorded as of three kinds:—allowed, excused and unexcused. Excuses must be obtained from the Committee on Absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required; and it is expected that no student will be absent, except in case of unavoidable necessity. To provide for such cases of necessity students are allowed, each term, as many absences without excuse, in any subject, as there are recitations per week in that subject. But this rule does not apply to examinations, or to recitations just before or after any vacation or recess, or to any class as a whole at any time, and is not to be interpreted as remitting any part of the total work of the term.

After the limit set in the last paragraph has been reached, however, as well as in those cases where the rule as stated does not apply, excuses may be granted only by the Absence Committee of the Faculty. No excuse will be granted except for protracted illness, or for reasons in every way exceptional; and no excuse will be given to provide for difficulties caused by the use of the allowance for unnecessary purposes. No excuse remits any work of the term.

The work lost by reason of an allowed absence or an excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

Any absence not allowed or excused counts as a failure.

After a number of unexcused absences equal to two weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

In the determination of a student's general standing marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students admitted with entrance conditions are required to remove them not later than the examination for the removal of conditions in the following March. Students who fail to meet this requirement are classed as irregular students. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the Faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No Senior who has failed to make up all his back work by the end of the second term of Senior year can be recommended for a degree, except by special vote of the Faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Saturday in December, March and May, as indicated in the College calendar. Registration for these examinations closes at 2:30 p. m. on the Wednesday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the College Office.

Students who have been excused by the Dean, in writing, from any term examination are reported "not examined" and may be examined later, at the option of the instructor, but such examination cannot be postponed beyond the first

conditions examinations. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the Dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the Faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave a prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Matriculation fee	$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term	25.00
Tuition, Engineering courses, per term	40.00
Graduate course in Electrical Engineering, per term	50.00
Room rent in dormitories per year.....$60 to	75.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term	8.00
Graduation fee, including diploma	15.00
Chemical laboratory fees:	
Required course, No. 1 or No. 1a, per term	8.00
Required course, No. 2, in Civil, Sanitary and Electrical Engineering, Junior year	15.00
Required course, No. 5, in Sanitary Engineering, Senior year	15.00
Elective courses, No. 2, No. 3 or No. 4, per term	15.00
E. E. laboratory fee, per term.....$2.00 to	10.00
Biological laboratory fees:	
Required course, No. 1, per term	2.00
Required course, No. 5, per term	3.00
Elective courses, No. 2 or No. 3, per term	6.00
Physical laboratory fees:	
Required course, No. 2, per term	4.00
Elective course, No. 1a, per term	5.00
Conditions examination fee	2.00
Fee for certificate of work done	2.00
Fee for certificate of graduation	1.00
Master's Degree, Registration and diploma	20.00

Students who take part of their Senior year's work at the Albany Medical College as provided on page 35 are charged $125 for the year's tuition, $50 to be paid to the Treasurer of Union College and $75 to the Treasurer of the Albany Medical College.

Tuition and other fees are due on the first day of each term.

Students must conform to the rules of the Treasurer's office regarding registration at the opening of each term, and will not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to College property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for $3.50 to $5 a week.

It is the custom of the student body to levy an annual campus tax of eleven dollars, five dollars of which is payable at the beginning of the fall term, three dollars at the beginning of the winter term, and three dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics consisting at present of foot ball, base ball, basket ball and track.

College Rooms

The College has two steam heated dormitories, accommodating ninety students. Most of the rooms are arranged in suites of two, and all are unfurnished; they are rented at prices varying from $50.00 to $60.00 per year for each student occupying a room. The rooms are cared for by competent persons, employed and paid by the college. No room is secured until a lease is signed and filed in the College Office. A student must occupy the room for which he signs, as transfers are not allowed. Each occupant of a College room will be held responsible for any damage done to the room. Students about to enter College who wish rooms in the dormitories should make early application to the Assistant Treasurer. On application, a list of rooms, giving location and price, will be furnished. It is very desir-

able that students about to enter College should secure their own room-mates before the College year opens. When this is not done the men will be located in the order of application. At the end of the College year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following Commencement Day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

Employment Committee

A Committee of the Faculty has been appointed to give assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from $2 to $4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the committee may be addressed to the Chairman, Prof. James H. Stoller.

SCHOLARSHIPS

Funds given especially for this purpose enable the College to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation.

2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.

3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.

Application blanks will be provided by the President or Dean upon request.

John David Wolfe Memorial Scholarships

The income of a Fund of Fifty Thousand Dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the Southern States.

These scholarships are available for students in all courses and are governed by the conditions named above.

Application blanks will be provided by the President or Dean upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding at least one hundred and fifty dollars a year, each.

All scholarships begin at the rate of one hundred and fifty dollars a year. After the first term the value of the scholarship depends upon the standing of the student.

Scholarships of $300 a year are granted to students who have had, in the preceding term, an average grade of 90 per cent. or more.

Scholarships of $200 a year are granted to students who have had, in the preceding term, an average grade of 85 per cent. or more.

Scholarships of $150 a year are continued to students who have had, in the preceding term, an average grade of 80 per cent. or more.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the State of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton County.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton County.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. To blood relatives living in any other part of the United States.

Nomination to scholarships is made by the Board of Directors of the Gloversville Free Library; and the nominees must pass satisfactory examinations at the College. Applications are received by the Directors of the Gloversville Free Library, Gloversville, N. Y.

The continuance of these scholarships is subject to the rules, stated on page 139 concerning the withdrawal of the general scholarships of the college.

Thomas Armstrong Scholarships

The late Thomas Armstrong of Plattsburgh, N. Y., provided for the grant of scholarships to residents of Clinton County, sons of practical farmers. Nominations to these scholarships are made by the Board of Supervisors of Clinton County, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this fund, amounting to two hundred dollars per year, will be awarded as a prize scholarship, upon the following conditions:

1. Candidates must be students in the Classical course, and of approved moral character.

2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the Freshman year.

3. They must pass successfully a special examination at the close of the Freshman year in each of the following subjects: Latin, Greek, Mathematics, English Composition, and either French or German. These examinations will be based upon the work of the Freshman year.

4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of his college course.*

5. The Prize Scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.

6. All questions pertaining to the administration of this scholarship will be determined by a committee composed of the President of the College, the Chairman of the Scholarship Committee of the Faculty, and a member of the Board of Trustees.

Horace B. Silliman Scholarships

Three scholarships have been founded by the Hon. Horace B. Silliman, class of '46, giving to each recipient the income from two thousand dollars ($2,000) annually.

These scholarships are to be awarded to active members of the college Young Men's Christian Association by a Committee composed of the President, the Dean, and the President of the Young Men's Christian Association, under such rules and conditions as shall be determined by such Committee, preference being given to students in the Classical course.

The award is made to one student annually at the close of the Freshman year.

Daniel F. Pullman Scholarship

The late Daniel F. Pullman, of Knox, Albany County, New York, provided in his will for the establishment of a scholarship of the value of $120 a year, to be given to a student in the classical course.

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*This scholarship is now held by Chauncey Holmes Winters, of the class of 1912.

The award is made by the faculty, and in accordance with the terms of the will preference is given to members of the Methodist Episcopal Church.

Law School Scholarships

Applicants for these scholarships, described below, must register at the College office by May 1st of Senior year.

John K. Porter Memorial Scholarships

A fund given by Mrs. John K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards will be made at Commencement to Seniors chosen by the Faculty.

Gilbert M. Speir Memorial Scholarship

A fund given by Mrs. Glover C. Arnold, in memory of her father, the late Judge Gilbert M. Speir, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University.

The sum of ninety dollars will be awarded at Commencement to the Senior chosen by the Faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on $1,000, which are given to the two members of the graduating class who deliver at Commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the Trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horatio G. Warner, LL. D., of Rochester, N. Y., founded an annual prize, consisting of silver plate of the value of $28, to be presented at Commencement to the "graduate of Union College, Classical course, who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is awarded by the Faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of $1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at Commencement to that Senior connected with the College for not less than two years who shall offer the best essay on one of two assigned subjects in English Literature or History.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a sealed envelope; the signature and the name of the prize

being given on the outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of $1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the Senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham Essay) by noon on May 15th. The prizes are awarded at Commencement.

Oratorical Prizes

Prizes are presented at Commencement to the two Juniors and the two Sophomores who deliver the orations best in composition and delivery on the occasion of Prize Speaking in Commencement week. Four Juniors and four Sophomores are selected for this competition by a committee of the Faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prize

Founded by George F. Allison, of New York city, and Wallace T. Foote, of Port Henry, N. Y., for the encouragement of debate in the Literary Societies. The prize consists of $100 in cash, and is to be awarded as the result of a public competition between representatives of the Adelphic and Philomathean Literary Societies. Fifty dollars will be awarded to the society presenting the strongest argument. The remaining $50 will be awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are to be left to the deter-

mination of a committee, consisting of the President, the Dean of the College, and the Professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of $1,000, the interest of which is devoted to a prize for conduct and character, without respect to scholarship, to be given at Commencement to a Senior who shall have passed through a full course of four years at the College.

Pullman Prizes

Mr. Daniel F. Pullman, of Knox, Albany County, New York, has bequeathed to Union College the sum of $2,000 to found two annual prizes.

The Pullman Classical Prize, of $40, is given to that member of the graduating class who, in an attendance of three years, has attained the highest standing in scholarship in the classical course.

The Pullman Engineering Prize, of $40, is given to that member of the graduating class who has taken the full course in the engineering department, and who shall have attained the highest standing in that course.

In awarding both prizes, preference is given to members of the Methodist Episcopal Church.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the College Treasurer, and returned all books borrowed from the College Library; he must also attend the conferring of Degrees, or be expressly excused therefrom. The candidate for a bachelor's degree must have entered college before the end of the first Senior term.

Degrees for Resident Study

The degrees of the College are conferred by authority of the Board of Trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree

The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 33; the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 33, the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 33; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, 6 or 7, pages 33, 34; the degrees of Bachelor of Engineering and Bachelor of Philosophy, upon those who have successfully completed Course 5, page 34.

The Master's Degree

The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 8, page 34; the degree of Master of Electrical Engineering, upon those who have successfully completed Course 9, page 35.

Degrees for Non-Resident Study

The degree of Master of Arts or of Master of Science will be given to graduates of Union College who have been reg-

istered as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfilment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register his name, address, and the two departments chosen, with the Dean of the College not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the Dean by May 1st for submission to the Faculty in time to provide for all necessary examinations before commencement.

A fee of $20 is charged, which covers examinations and diploma; of this amount $10 is payable at the time of registration and $10 at the time of the final examinations.

Honors

All commencement prizes are limited to A. B., Ph. B., or B. S. students who have entered at or before the beginning of the Senior year, and who are in full standing at the close of the second term; and to Engineering students entered likewise and in full standing at the close of the second term, in both the Engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments

These honors are assigned to ten Seniors on the basis of scholarship, as stated under Standing, page 130. Provisional appointments are made at the close of the second term Senior, and become final if those who receive them retain the same relative rank to the end of their course. Under present

regulations, no other persons can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive commencement appointments as the result of the third term's work are excused from speaking unless the Faculty direct otherwise.

The Valedictory

This honor is awarded to the Senior of highest standing among the ten receiving Commencement appointments.

Special Honors

Special Honors are also given at graduation in each of the following subjects: Greek, Latin, English Language, English Literature French, German, Mathematics, Physics, Chemistry, Biology, Economics, History, Sociology and Philosophy. The work required in each case will be equivalent of three terms of class-room work of two hours per week each, and will be outside of the prescribed or elective courses. The candidate for Special Honors must apply to the head of the department in which he proposes to take Honors not later than the first Monday of the Spring term of the Junior year. He must have attained in all the studies of the department in which he tries for Honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the Senior year to the Faculty, who shall decide in each case whether the work done is worthy of an Honor. The Honors attained are stated in the diploma, and the names of the students who take Honors are printed on the Commencement programme.

Phi Beta Kappa Society

At the end of the third term of the Senior year, one-third of the members of the graduating class in the Classical

course, candidates for the degree of Bachelor of Arts, may be elected to membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given, as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York Chapter was established in 1817; and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma Xi

Election to the honorary scientific Society of Sigma XI, is one of the honors open to Seniors of marked ability in the Scientific and Engineering departments. Membership is confined to the Faculty, Senior candidates for graduation, and Alumni. The election occurs during the latter part of the Senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The Society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED

AT THE

ONE HUNDRED AND THIRTEENTH ANNUAL COMMENCEMENT

June 9, 1909

Honorary

LL. D.

Joseph H. Choate.....New York City
Benjamin H. Ripton.....Schenectady
Frank Smalley*.....Syracuse

D. D.

Edward T. Carroll.....Amsterdam

Sc. D.

Ernst J. Berg.....Schenectady

L. H. D.

Robert C. Ogden.....New York City
William W. Bellinger.....New York City

Art. D.

George F. Allison.....New York City

A. M.

Andrew H. Green.....Detroit, Mich.

*Conferred October 23, 1909.

In Course

A. M.

George Leroy Shelley.....Mercersburg, Pa.

M. E. E.

Leroy Bloom Cramer.....Portland, Ore.
Cassius Miles Davis.....Detroit, Mich.
Hugh Garnett Davis.....Lynchburg, Va.
Olin Jerome Ferguson.....Schenectady

B. E.

Howard Lansing Keith.....Schenectady
Charles Franklin Mulrooney.....Schenectady
George William Wright.....Ogdensburg
(as of the class of 1908)

Class of 1909

A. B.

Roy Hamilton McCormack.....Delmar
Elmer Wallace King Mould.....Green Island
Carl Wachter .....Schenectady
James Bell Welles.....Geneseo

Ph. B.

James Bradin Chapman.....Broadalbin
Charles Roscoe Failing.....Palatine Bridge
Ward Winthrop Millias.....Castleton
Alvin Ury .....Schenectady
Ralph J. Ury.....Schenectady

B. S.

Francis Temple Chase.....Utica
Adelbert Garry Clark.....Elmira
Winfred MacBain Corbin.....Binghamton
John William Faust.....Schenectady

Doane Sinclair Guardinier.....East Springfield
Harry David Hanford.....Unadilla
Jonathan Pearson .....Hudson
Chester Leland Rankin.....Schenectady
Otto Jean Walrath.....Gloversville
Ernest McMillan Wilson.....Hebron

B. E.

Floyd Elmer Allen.....Elmira
William Waldo Brown.....Brooklyn
Robert Leonard Brunet.....Petersburg, Va.
Clarence E. Burleigh.....Plattsburg
Francis William Burleigh.....Plattsburgh
Rhodolphus Philip Clark.....Kingston
Raymond J. Finch.....Alpine
Leon Burhans Foote.....Whitehall
Edward Everett Harkness.....Harkness
Raymond Marsham Jolley.....South Bethlehem
Emil Kiessling .....New York City
Henry Edward Lewis.....Ballston Spa
John Joseph McCormick, Jr.....Troy
Cromwell McIntosh .....Buffalo
Shiv Narayan .....Kashmir State, India
Cedric Potter .....Omaha, Neb.
Edwin H. Robinson.....Watervliet
George William Roosa.....Buffalo
Herbert Davis Schutt.....Schenectady
Pierre J. Simkins.....Amsterdam
Harold Ernest Starbuck.....Gouverneur
Arthur Jacob Streibert.....Albany
Ralph Henry Tapscott.....Brooklyn

AWARDS

Valedictory

Elmer W. K. Mould.....Schenectady

Commencement Orations

Robert Leonard Brunet.....Petersburg, Va.
Roy Hamilton McCormack.....Delmar
Herbert Davis Schutt.....Schenectady
Ralph J. Ury.....Schenectady
Otto Jean Walrath.....Gloversville
James Bell Welles.....Geneseo
Ernest McMillan Wilson.....Salem

Engineering Theses

William Waldo Brown.....Brooklyn
Raymond J. Finch.....Horseheads
Herbert Davis Schutt.....Schenectady
Robert Leonard Brunet.....Petersburg, Va.
Rhodolphus Philip Clark.....Kingston
Cromwell McIntosh .....Buffalo

Special Honors

In Biology..... Otto Jean Walrath
In English Literature.....Ralph J. Ury
James Bell Welles
In Greek..... James Bell Welles
In History.....Alvin Ury
In Mathematics..... Robert Leonard Brunet
Roy Hamilton McCormack
Elmer W. K. Mould
In Philosophy..... Winfred MacBain Corbin
Ralph J. Ury
Carl Wachter
In Latin.....Roy Hamilton McCormack
Elmer W. K. Mould

Warner Prize

Elmer W. K. Mould

Blatchford Oratorical Medals

1st. Elmer W. K. Mould
2d. Robert L. Brunet

Ingham Prize

Ralph J. Ury

Allen Essay Prizes

1st. Roy H. McCormack
2d. Ralph J. Ury
3d. Robert L. Brunet

Daggett Prize

John William Faust

Junior Oratorical Prizes

1st. Albert E. Carmichael
2d. Roland M. Bartlett

Sophomore Oratorical Prizes

1st. Leo A. Hanigan
2d. Harry G. Cohen

Allison-Foote Prizes

Won by the Adelphic Society
and
James M. Dunn
Class of 1912

R. C. Alexander Prize Scholarship

Chauncey Holmes Winters
Class of 1912

John K. Porter Memorial Scholarships

Charles R. Failing
Jonathan Pearson
Ralph J. Ury

Gilbert M. Speir Memorial Scholarship

Alvin Ury

The Rankine Prize for Extemporaneous Speaking

Samuel M. Cavert

Phi Beta Kappa

Elmer W. K. Mould
Roy Hamilton McCormack

Sigma Xi

Cassius Miles Davis
Robert L. Brunet
R. Philip Clark
Otto Jean Walrath
Raymond J. Finch
Herbert Davis Schutt

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle Street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, pathology, bacteriology, experimental physiology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Incurables, County Hospital, South End Dispensary, Eye and Ear Infirmary, Albany Orphan Asylum, and dispensaries connected with each, are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the Albany Hospital, and other hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

President
SIMON W. ROSENDALE

Vice-President
ALDEN CHESTER

Treasurer
JOHN H. JACKSON

Secretary
CHARLES F. VAN BENTHUYSEN

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AMASA J. PARKER	LUTHER H. TUCKER
J. TOWNSEND LANSING	EDWARD J. HUSSEY
JESSE W. POTTS	T. HOWARD LEWIS
EDWARD A. DURANT	ROBERT C. PRUYN
CLIFFORD D. GREGORY	ROBERT OLCOTT
EDWARD BOWDITCH	JAMES B. McEWAN
GEORGE ALEXANDER	

MAYOR OF ALBANY
RECORDER OF ALBANY } Ex-Officio

CATALOGUES are sent with care, and graduates of the college changing their post-office address, or not receiving them, will please notify

WILLIS G. TUCKER, M. D., *Registrar*
ALBANY MEDICAL COLLEGE
Albany, New York

FACULTY

CHARLES ALEXANDER RICHMOND, D. D.
Chancellor of the University

ALBERT VANDER VEER, M. D., PH. D.
Professor of Surgery

JOHN MILTON BIGELOW, M. D., PH. D.
Professor Emeritus of Materia Medica, Therapeutics and Diseases of the Throat and Nose

SAMUEL BALDWIN WARD, M. D., PH. D.
Dean
Professor of Theory and Practice of Medicine and of Hygiene

JAMES PETER BOYD, M. D.
Professor of Obstetrics, Gynecology and Diseases of Children

WILLIS GAYLORD TUCKER, M. D., PH. D.
Registrar
Professor of Chemistry and Toxicology

WILLIAM HAILES, M. D.
Anthony Professor Emeritus of Pathological Anatomy, Histology and Fractures and Dislocations

CYRUS STRONG MERRILL, M. D.
Professor of Ophthalmology and Otology

FREDERIC COLTON CURTIS, M. D.
Professor of Dermatology

HENRY HUN, M. D.
Professor of Diseases of the Nervous System

SAMUEL ROSEBURGH MORROW, M. D.
Professor of Practice of Surgery and of Orthopedic Surgery

HERMON CAMP GORDINIER, M. D.
Professor of Physiology

HOWARD VAN RENSSELAER, M. D.
Professor of Materia Medica and Therapeutics, and Adjunct Professor of Theory and Practice of Medicine

JOSEPH DAVIS CRAIG, M. D.
Professor of Anatomy, and Curator of the Museum

WILLIS GOSS MACDONALD, M. D.
Professor of Abdominal and Clinical Surgery

ANDREW MacFARLANE, M. D.
Professor of Physical Diagnosis and Medical Jurisprudence

ARTHUR GUERNSEY ROOT, M. D.
Professor of Diseases of the Throat and Nose

LEO HAENDEL NEUMAN, M. D.
Professor of Gastro-Enteric Diseases, and Clinical Professor of Theory and Practice of Medicine

---

Clinical Professors

HERMAN BENDELL, M. D.
Otology.

JESSE MONTGOMERY MOSHER, M. D.
Insanity, Neurology and Electro-Therapeutics

HARRY JUDSON LIPES, M. D.
Obstetrics

EDGAR ALBERT VANDER VEER, M. D.
Surgery

ARTHUR WELLS ELTING, M. D.
Surgery and Lecturer on Surgical Pathology

JOHN ALBERTSON SAMPSON, M. D.
Gynecology

ARTHUR SAUTTER, M. D.
Dermatology and Lecturer on Genito-Urinary Diseases

GEORGE EMORY LOCHNER, M. D.
Gynecology

CLEMENT FRANK THEISEN, M. D.
Diseases of Throat and Nose

HENRY LARNED KEITH SHAW, M. D.
Diseases of Children

Adjunct Professors

SPENCER LYMAN DAWES, M. D.
Materia Medica

THOMAS ORDWAY, M. D.
Pathology and Bacteriology

VICTOR CARL MYERS, PH. D.
Physiological Chemistry and Director of Laboratory

Lecturers

WILLIAM OLIN STILLMAN, M. D.
History of Medicine

ARTHUR TURNER LAIRD, M. D.
Clinical Microscopy

CHARLES HENRY MOORE, M. D.
Ophthalmology and Otology

JAMES FRANCIS ROONEY, M. D.
Hygiene, and Instructor in Medicine

HOWARD EATON LOMAX, M. D.
Anatomy, Assistant Demonstrator of Anatomy

GEORGE GUSTAVE LEMPE, M. D.
Anatomy, and Instructor in Surgery

LA SALLE ARCHAMBAULT, M. D.
Neurology

GEORGE EVERETT BEILBY, M. D.
Histology, and Instructor in Surgical Pathology

ARTHUR FENWICK HOLDING, M. D.
Radiography

WILLIAM ATWOOD LARKIN, PH. G.
Inorganic Chemistry, and Instructor in Organic Chemistry
Assistant to the Registrar

JAMES NEWELL VANDER VEER, M. D.
Surgical Technic, and Instructor in Genito-Urinary Surgery

EDWARD WATERBURY BECKER, M. D.
Experimental Physiology

ARTHUR JOSEPH BEDELL, M. D.
Ophthalmology

JAMES WESLEY WILTSE, M. D.
Dermatology and Genito-Urinary Diseases

Instructors

ALVAH HARRY TRAVER, M. D.
Surgery

EDGAR ROSCOE STILLMAN, M. D.
Physiology

HARRY WARDELL CAREY, M. D.
Physical Diagnosis

EDWARD GERALD GRIFFIN, M. D.
Therapeutics

CHARLES KNICKERBACKER WINNE, Jr., M. D.
Materia Medica and Theory and Practice of Medicine

JOSEPH ALOYSIUS LANAHAN, M. D.
Dermatology

HARRY RULISON, M. D.
Clinical Microscopy

BRANSEN KEEMPER DE VOE, M. D.
Anatomy

EUGENE EUNSON HINMAN, M. D.
Diseases of Throat and Nose

JOHN HENRY GUTMANN, M. D.
Surgery and Obstetrics

MALCOLM DOUGLAS, M. D.
Histology and Physical Diagnosis

CLINTON BENJAMIN HAWN, M. D.
Clinical Microscopy and Physiological Chemistry

ERASTUS CORNING, M. D.
Theory and Practice, and Physical Diagnosis, Demonstrator of Anatomy

LEROY SOLOMON BLATNER, D. D. S.
Oral Pathology

JOSEPH LEWI DONHAUSER, M. D.
Surgery

WILLIAM KIRK, M. D.
Anatomy and Physiology of the Nervous System

WALTER ANCEL REYNOLDS, M. D.
Anatomy, Prosector of Anatomy and Assistant Curator of Museum

JEROME MEYERS, M. D.
Gastro-Enteric Diseases

Clinical Assistants

William Henry George, M. D.
Michael Daniel Stevenson, M. D.
Washington Irving Goewey, M. D.
Elijah Hudson Rider, M. D.
William Pitney Brierley, M. D.
George Washington Papen, Jr., M. D.
William Grant Lewi, M. D.
Martin MacHarg, M. D.
Louis LeBrun, M. D.
James Manning Moore, M. D.
George Stephen Munson, M. D.
Joseph Patrick O'Brien, M. D.
Joseph Ambrose Cox, M. D.
Miles Ambrose McGrane, M. D.
Frederic Charles Conway, M. D.
Theobald Frederic Doescher, M. D.
Daniel Vincent O'Leary, Jr., M. D.
Agnes Elizabeth Page, M. D.
Joseph Lewi Bendell, M. D.
Tiffany Lawyer, M. D.
Charles James Kelley, M. D.
Harry Houghton Drake, M. D.
Harley Heath, M. D.
Ellis Kellert, M. D.
Edward Daniel Donohue, M. D.
Arthur Emerson Pitts, M. D.
Edward Johnson Abbott, M. D.
Frederick William McSorley, M. D
Burlin George McKillip, M. D.
Edward Raymond Messer, M. D.
Eddy Stearns Haswell, M. D.

CALENDAR 1909-1910

1909

Regular winter session begins.....Tuesday, September 21
Thanksgiving vacation begins.....Wednesday, November 24
Lectures resumed .....Monday, November 29
Christmas vacation begins.....Thursday, December 23

1910

Lectures resumed .....Monday, January 3
Commencement .....Tuesday, May 17

ADMISSION

All matriculates must secure 60 academic counts or their full equivalent, before beginning the first annual course counted toward the degree unless admitted conditionally, in which case the deficiency is not to exceed 15 academic counts and must be made up before the student begins the second annual course counted toward the degree.

When all requirements are fulfilled, the regents issue a medical student certificate which the candidate must file with the Registrar of the college.

All communications relating to these examinations should be addressed to the Examinations Division, New York State Education Department, Albany, N. Y., and not to this college.

Preliminary Examination.—The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the High School Department, University State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, January 17-21, 1910.

Mid-Winter Written Examinations in all the departments are held before the Christmas vacation. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy**—three lectures; six hours osteology and dissection. 2. **Inorganic Chemistry**—two and a half lectures; four hours laboratory; one recitation. 3. **Organic Chemistry**—two lectures; one recitation. 4. **Physiology**—two lectures; one recitation; two hours demonstration. 5. **Hygiene**—one lecture. 6. **Histology**—five hours laboratory; one recitation. 7. **Materia Medica**—three lectures; two recitations.

Lectures 13½; laboratory 9 hours; dissection and demonstrations 8 hours; recitations 6.

Second Year

1. **Anatomy**—two lectures; seven hours dissection and demonstration; two recitations. 2. **Anatomy and Pathology of Nervous System**—one lecture; two and a half hours laboratory. 3. **Organic and Physiological Chemistry and Toxicology**—one and a half lectures; three hours laboratory; one-half recitation. 4. **Physiology**—one lecture; two and a half hours laboratory; one and a half recitations. 5. **Therapeutics**—one lecture; one-half recitation. 6. **Theory and Practice**—two lectures; one-half recitation. 7. **Surgery**—two demonstrations. 8. **Bacteriology and Pathology**—eight hours laboratory. 9. **Physical Diagnosis**—one demonstration half the term.

Lectures 8½; dissections and demonstrations 9½ hours; laboratory 16 hours; recitations 5.

Third Year

1. **Theory and Practice**—four lectures; two recitations; one hour clinics. 2. **Clinical Microscopy**—two and a half hours laboratory. 3. **Therapeutics**—two lectures; one recitation. 4. **Electro-therapeutics**—one lecture half the term. 5. **Ob-**

stetrics and Gynecology—three lectures. 6. **Pediatrics**—one lecture, one recitation half the term. 7. **Neurology**—one lecture; one recitation; one clinic. 8. **Surgery (pathology, operative, fractures, dislocations)**—five lectures; two and a half hours laboratory; two recitations; three hours clinics. 9. **Physical Diagnosis and Ophthalmology**—section work, two hours. 10. **Medical Jurisprudence**—one lecture half the term. 11. **X Rays**—one demonstration half the term. 12. **Obstetrical Histology and Pathology**—two and a half hours laboratory. 13. **History of Medicine**—one lecture half the term.

Lectures 17½; laboratory 7½ hours; demonstrations ½ hour; recitations 6; section work 2; clinics 5.

Fourth Year

1. **Theory and Practice**—three lectures; one recitation; two and a half hours clinics. 2. **Neurology**—one lecture; one clinic. 3. **Gynecology**—one lecture half the term. 4. **Obstetrics**—two and a half lectures. 5. **Surgery (including Orthopedics)**—four lectures; one recitation; three hours clinics. 6. **Specialties**—one recitation. 7. **Conferences**—one medical; one surgical. 8. **Clinical section work**—sixteen hours.

Lectures 11; recitations 3; conferences 2; clinics 6½; clinical section work 14 hours.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application to the Registrar.

Laboratories

Practical Chemistry. The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded, since although some knowledge of chemistry is highly desirable none is now required at entrance, by a series of lessons upon chemical nomenclature, notation and the essential principles of theoretical chemistry, including the laws of combination and

valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids, which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboards, discussed by the class, and entered upon their notes.

Physiological Chemistry. Laboratory work in this subject consists in the isolation, preparation and identification by tests, of the various important proteins, fats and carbohydrates. The composition of the tissues and organs is next studied with special reference to their most important constituents; the chemistry of digestion, secretion and excretion then receives attention in relation to the several physiological process involved. Finally there follows a thorough course in qualitative and quantitative urine analysis. The student is required to make careful and thorough notes of the actual experiments performed and also of the deductions to be drawn from them. The practical work is interspersed with lectures and recitations.

Histology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on Lake Avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender, of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Bacteriology. The work consists of lectures followed by practical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies, and material from autopsies and surgical operations is demonstrated to them as available. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, fæces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

In all these courses the student is taught independent methods of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for physicians in the vicinity, this laboratory offers excellent facilities for the examination of urine, sputum, pathological specimens and blood. Information regarding such examinations may be obtained by communicating with Dr. Thomas Ordway, Director.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sec-

tions of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work especial attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, dermatology, neurology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, operative obstetrics, electrotherapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and are as follows:

First Year

Matriculation	$5 00	
Lecture Course	100 00	
Chemical Laboratory	10 00	
Histological Laboratory	10 00	
Dissection (including material)	5 00	
		$130 00

Second Year

Matriculation	$5 00	
Dissection (including material)	10 00	
Lecture Course	100 00	
Bacteriological and Pathological Laboratory	15 00	
Physiological Chemistry and Experimental Physiology	15 00	
		145 00

Third Year

Matriculation	$5 00	
Lecture Course	100 00	
Clinical Microscopy, Surgical and Obstetrical Pathology	15 00	
		$120 00

Fourth Year

Matriculation	$5 00	
Lecture Course	100 00	
Final Examination	25 00	
		130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session. There is also a fee of five dollars paid by members of the fourth year class to the Guild for the Care of the Sick for the course in practical obstetrics.

The payment of three hundred dollars in advance entitles to attendance upon four courses of lectures, exclusive of laboratory and other special fees above stated, and effects a saving of one hundred dollars on the cost of the four year course, *but this ticket must be taken out within thirty days from date of matriculation.* All other fees are payable strictly in advance except that the final examination fee may be paid at any time before the examinations begin. Graduates of the school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. The janitor of the college keeps a list of boarding houses at which good rooms and board can be obtained at from four to five dollars a week or upwards, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses since these of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other recognized medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in "Examination Departments," as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under "Examination Rules." No credit will be given for work done elsewhere in fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

WILLIS G. TUCKER, M. D., *Registrar*

Albany, New York

ALBANY LAW SCHOOL

This School is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. The school is and has been largely represented in the Executive, Judicial and Legislative departments of this and many other States, as well as of the federal government.

It became a part of Union University in 1873, and begins its sixtieth year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading States in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other Law School in the State for observing the methods and procedure collectively of the executive, judicial and legislative departments of the State governmment. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated.

It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it is not so

large as to make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed.

Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the State Law Library, the most extensive and best selected in the United States, consisting of 65,000 volumes or more.

With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

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Special Lecturers. The list of special lecturers is a notable one, including the former Chief Judge and two Associate Judges of the Court of Appeals, a Justice of the Supreme Court and a former Supreme Court Justice.

Hubbard Chair of Legal Ethics. The circulars of seventy of the leading Law Schools of the country show that only twenty of this number make the subject of Legal Ethics part of their curriculum. With two exceptions, those schools are either in the West or South. These facts led Gen. Thomas H. Hubbard, class of '60, to place at the disposal of the Board of Trustees the sum of $10,000, the income to be applied to lectures upon this subject. The Board of Trustees decided to inaugurate the course at the opening of the school year of 1903. Gen. Hubbard, the founder of the chair, delivered the opening lecture, and will be followed during the academic year 1909-10 by Judge William E. Werner of the Court of Appeals, Hon. Alton B. Parker, late Chief Judge of that Court, and others.

CALENDAR

First Semester

1909

September 21. Registration of students
Tuition due
September 22. Scholastic year begins
November 2. Election day. Recess one day
November 24. (Noon.) Thanksgiving vacation begins
November 30. Lectures resumed.
December 23. (Noon.) Holiday vacation begins.

1910

January 5. Lectures resumed
January 29. McKinley Day
February 3, 4. Examinations

Second Semester

February 7. Semester begins
Registration of students
Tuition due
February 22. Washington's Birthday. Recess one day
March 25. Good Friday. Recess one day
May 30. Decoration Day. Recess one day
June 2, 3. Examinations
June 9. Commencement.

ADMISSION AND GRADUATION

Admission to Junior class. The full course of study consists of two scholastic years, divided into two semesters each. Any student who has conformed to the requirements of the Regents as to general education after commencing the study of law, may enter the Junior class, and upon completion of the two years' course and passing the required examinations will be graduated with the degree of LL. B.

College graduates will find this course well adapted to the requirements of the Court of Appeals, requiring them to study law two calendar years after graduation. They can enter the school upon presentation of their certificate of graduation, without examination, attend the full course of two years, of not less than eight months each, receive the degree of LL. B., and take the bar examination in June following their graduaation from the school.

Admission to Senior class. Any student not a college graduate who has completed two years of required legal study, after conforming to the requirements of the Regents as to general education, or any college graduate who has completed one year of such study after graduation, will be admitted to the Senior class without examination upon production of the Regents' certificates and certificate of Clerk of Court of Appeals, and will be admitted to the privileges of the class but will not be received as a candidate for a degree.

Students who have attended a law school and satisfactorily completed the work of the Junior year will be allowed to enter as candidates for a Degree in the discretion of the Faculty.

Degree. The degree of LL. B. will be conferred only upon students who have completed the entire course of two years at a law school.

EXPENSES

The fees for tuition are payable in advance as follows: For the full course of one year, tuition, $110; matriculation fee, $10; fee for certificate of attendance, diploma and expenses attendant upon commencement, $10, or $65 for the first semester and $65 for the second. For the full course of two years upon conferring degree of LL. B., tuition, $220, $10 matriculation fee, fee for certificate of attendance, diploma and expenses attendant upon commencement, $10, or $65 for the first semester and $55 for each semester thereafter, except the last, which will be $65.

For catalogues or further information address

JNO. J. HUGHES, *Secretary*
Albany Law School
Albany, New York

THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake Avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of Albany. It is devoted to original researches in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of "Annals," and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at the present time is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole. The staff consists of the director, nine assistants and seven computers.

The instrumental equipment of the Observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn Equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott Meridian Circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory.

In addition to these instruments, the Observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W. Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution.

Since 1902, annual grants have been made to the Director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie Institution made special provision for carrying on the star researches upon which the Observatory is engaged for a period of ten years. This includes an appropriation which enables the Observatory to send the Olcott Meridian Circle to the Southern Hemisphere for several years with an ample force of observers, in order to carry out an essential feature of its investigations. The Southern Observatory is now under process of construction and will be in operation early in 1909.

The Dudley Observatory is not designed to give general instruction in Astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the Observatory.

The Observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

For further particulars apply to

LEWIS BOSS
Director

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ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the Board of Governors of Union University, June 21, 1881, and constitutes the **Department of Pharmacy of Union University.** It was incorporated as the "Albany College of Pharmacy" August 27, 1881.

The exercises of the college are held in the Albany Medical College building on Eagle street, distant but a block from the Capitol, and in the laboratories on Howard street. The lecture rooms and laboratories are well adapted to the needs of the college and furnish to the faculty excellent facilities for imparting instruction. The lectures are delivered in the chemical lecture room on the first floor, adjoining which is the large and well-fitted chemical laboratory where instruction is given to the classes in practical chemistry. Systematic instruction is given in the laboratories in pharmaceutical operations and dispensing, and in microscopy and pharmacognosy.

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JARED WATERBURY SCUDDER, A. M.
Instructor in Latin

CALENDAR FOR 1909-1910

1909

Introductory lecture, Monday, October 4.
Election vacation, Monday and Tuesday, November 1 and 2.
Christmas vacation begins Monday, December 20.

1910

Lectures resumed Monday, January 3.
Commencement Tuesday, April 19.

ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age and will be required to present a PHARMACY STUDENT CERTIFICATE issued by the New York State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, N. Y.

THE CURRICULUM

of the college embraces:

Chemistry—Theoretical, General, Pharmaceutical and Analytical
Botany—Structural, Systematic and Analytical
Materia Medica and Pharmacognosy
Pharmacy—Theoretical and practical
Microscopy—Theoretical and practical in its relations to Pharmacy
Toxicology
Pharmaceutical Mathematics
Physics
Physiology
Latin

REQUIREMENTS FOR GRADUATION

The diploma of this college confers the degree of GRADUATE IN PHARMACY (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR

Matriculation	$5 00
Tuition	75 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

THEODORE J. BRADLEY, PH. G., *Secretary*
4 Lancaster street
Albany, New York

ENROLLMENT, UNION UNIVERSITY, 1909-10

STUDENTS OF UNION COLLEGE

Abbreviations

c, A. B. course; *ls*, Ph. B. course; *s*, B. S. course; *e*, B. E. course in General Engineering; *se*, B. E. course in Sanitary Engineering *ee*, B. E. course in Electrical Engineering; *els*, B. E. General Engineering and Ph. B. six year course; *m*, attending Albany Medical College; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

An asterisk (*) before a student's name indicates that he has not been advanced in standing with his class.

Candidates for the Degree of Master of Arts

Henry Winne Bell, Ph. B.....*Albany*
Leslie Nathan Broughton, A. B.....*Victor*
Samuel B. Howe, Jr., A. B.....*Plainfield, N. J.*
Roy Hamilton McCormack, A. B.....*Delmar*
Floyd Leslie Miller, Ph. B.....*Batavia*
Elmer W. K. Mould, A. B.....*Mercersburg, Pa.*
Lewis S. Parsons, A.B .....*Liberty.*
Charles N. Waldron, B. S.....*Buffalo*
Mark S. Watson, A. B.....*Chicago, Ill.*
James Bell Welles, A. B.....*Morris*

Candidates for the Degree of Master of Science

Raymond S. Bennett, Ph. B.....*Schenevus*
Shiv Narayan, M. A., B. Sc.....*India*

Graduate Students

John A. C. Callan, B. S. in C. E..*Schenectady*.....211 Seward Place
Candidate for the degree of Master of Civil Engineering.

R. Philip Clark, B. E.....*Schenectady.* Phi Gamma Delta House
Candidate for the degree of Master of Electrical Engineering.

James H. Cunningham, B. E....*Schenectady*.....College Hill,
Candidate for the degree of Master of Electrical Engineering.

Leland W. Irish, B. E.....*Northwestern Univ*.....Evanston, Ill.
Candidate for the degree of Master of Civil Engineering.

George W. Roosa, B. E.....*Schenectady*... .Delta Upsilon House
Candidate for the degree of Master of Electrical Engineering

Oscar von Voigtlander, M. E....*Schenectady*.....317½ Seward Pl.
Candidate for the degree of Master of Civil Engineering.

Daniel A. Young, B. S. in C. E...*Schenectady*.....320 Lenox Rd.
Candidate for fhe degree of Master of Civil Engineering.

Seniors, Class of 1910

m William A. Ackroyd.....*Albany*.....Alb. Med. Coll.

e William Joseph Anderson.....*Glens Falls*.....B. I. W. Lodge

ls Roland Miller Bartlett.....*Glendale, Mass*.....N. S. N. C.

ee Walter J. Becker.....*Altamont*.....146 Nott Terrace

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e Thomas Bernard Bergan.....*Auburn*.....B. I. W. Lodge

e John Hammond Bovier.....*Elmira*.....Pyramid Club

s Albert Edward Carmichael.....*Schenectady*.....201 Union St.

c Samuel McCrea Cavert.....*Ballston Spa*.....Silliman Hall

ls William Lane Cavert.....*Ballston Spa*....29 Furman St.

c Arthur Russell Chaffee.....*Morristown*.....513 Smith St.

ee John G. Charest.....*Schenectady*.....12 Barrett St.

s Harry Gabriel Coplon.....*Troy*.....563 So. Centre St.

ee Archibald R. Dennis.....*Kalamazoo, Mich*..A Δ Φ House

**ee* George A. Dillinger.....*Nuernberg, Ger*...Pyramid Club

e Harley Dunbar.....*Gloversville*.....Δ Φ House

s William Ferguson.....*Oneida*.....Ψ Υ House

ee Harlan Haviland Grover.....*Glens Falls*.....Δ Υ House

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e	Louis Albert Hequembourg	*Schenectady*	22 Gillespie St.
e	Adam John Horn	*St. Johnsville*	Pyramid Club
s	J. Mason Hotchkiss	*Schenectady*	70 Union Ave.
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ls	Edward B. Irish	*Schenectady*	113 Campbell Ave.
ee	Stephen Dunn Kelley	*Saratoga Springs*	Β Θ Π House
ee	Arnold Edward Kriegsmann	*Schenectady*	27 Wendell Ave.
m	William H. Ladue	*Plattsburg,*	Alb. Med. Coll.
s	Howard C. Macomber	*Delanson*	Delanson
e	John J. McManus	*Albany*	B. I. W. Lodge
ee	William B. Neilson, Jr	*Mechanicville*	Δ Φ House
c	Roscoe Almond Paul	*Athens*	183 Nott Terrace
ee	William Edward Paul	*Athens*	183 Nott Terrace
s	Arthur Cuthbert Potter	*Omaha, Neb.*	Χ Ψ Lodge
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ee	Paulo Floriano de Toledo	*San Paulo, Braz.*	14 Barrett St.

c Harry G. Van Deusen.....*Cooperstown*.....Φ Δ Θ House
s Horace E. Vedder.....*Pasadena, Cal*.....X Ψ Lodge
c Theodore Demarest Walser.....*Cohoes*.....A Δ Φ House
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ee Peter J. Whitmore.....*West Coxsackie*.146 Nott Terrace
**e* William DeWitt Zielley.....*Avoca*.....Pyramid Club
e Judson Zimmer.....*Gloversville*.....Δ Φ House

Seniors—53.

Juniors, Class of 1911

ee Anderson Allyn.....*Holyoke, Mass*.....Δ Υ House
e Charles Gorsch Atkin.....*East Orange, N. J.*.B Θ Π House
ee George Bean Baker.....*Yonkers*.....864 Union St.
e Harold Wallace Baker.....*Oneida*.....Ψ Υ House
e Louis Ray Bennett.....*Howard*.....Pyramid Club
e Lawrence William Bentley.....*Elmira*.....864 Union St.
ls Harold Eugene Blodgett.....*Schenectady* 168½ Lafayette St.
ee Franklin J. Bowman.....*St. Johnsville*.....Δ Υ House
ee Edward Henry Branson.....*Coatesville, Pa*.....Φ Γ Δ House
c Michael William Bray.....*Churubusco*.....B. I. W. Lodge
e Arthur Doren Brown.....*Ogdensburg*.....A Δ Φ House
e Herman Fred W. Brumm.....*Tonawanda*.....Pyramid Club
e Charles Milton Canfield.....*East Orange, N. J.*.B Θ Π House
c Walter Dudley Cavert.....*Ballston Spa*....29 Furman St.
c Tristram Coffin.....*Hudson*.....K A Lodge
ls Harry Arthur Cohen.....*Schenectady*.....119 State St.
e Earl K. Dewey.....*Adams*.....Pyramid Club
**ee* Walter R. H. Dick.....*Schenectady*.....3 Avenue B
e Charles F. Duchscherer.....*Buffalo*.....B. I. W. Lodge

s	T. Gillespie Dunn	*Hadley*	Φ Δ Θ House
ls	Otto Alois Faust	*Schenectady*	Δ Δ Φ House
ee	Eugene D. Fink	*Schenectady*	33 Wendell Ave.
ee	George Merchant Fowler	*Buffalo*	Δ ϒ House
ee	Harold Jesse Goodman	*Albion*	N. S. N. C.
s	Bernard A. Gray	*Black River*	N. S. N. C.
c	Leo Augustine Hanigan	*Schenectady*	938 State St.
ee	Everett Keeler Hawley	*Hartford, Conn*	X Ψ Lodge
s	Burton Houk	*Owego*	Β Θ Π House
e	Charles Sheldon Hubbard	*Bayshore, L. I.*	K Δ Lodge
ee	John S. Hunter	*Willimantic, Conn.*	Φ Δ Θ House
ee	Gustave Huthsteiner	*Schenectady*	120 Park Ave.
s	Hans Huthsteiner	*Schenectady*	120 Park Ave.
e	Neil Dutton Hyde	*Afton*	S. S. S. C.
ee	Strickland K. Hyde	*Hackensack, N. J.*	Δ Δ Φ House
s	Henry Berger Keckeley	*Charleston, S. C.*	Σ Φ Place
ee	Andrew Vincent Kelly	*Albany*	B. I. W. Lodge
e	Harry MacConnell Leon	*Little Falls*	Ψ ϒ House
**ee*	Willis C. Lincoln	*Schenectady*	606 Hamilton St.
ls	Charles Frederick MacGill, Jr	*Aurora, Ill*	Δ Δ Φ House
e	Manly Leonard Mackey	*Cobleskill*	32 Furman St.
c	Arthur Lyman Maxon	*Schenectady*	127 Furman St.
ee	Rufus B. McConnell	*Buffalo*	Δ ϒ House
e	Randal John McCullough	*Chazy*	B. I. W. Lodge
c	Ransom Rathbone Micks	*Seneca Falls*	Δ Δ Φ House
ee	Stanley Congdon Miller	*Elmira*	X Ψ Lodge
s	Charles Inslee Mohair	*Newton, N. J.*	Pyramid Club
e	Chester Moore	*Horseheads*	B. I. W. Lodge

e Harold Wheeler Morss.....*Albany*.....K A Lodge
ls Edward J. O'Connell.....*Albany*.....B. I. W. Lodge
s John Bancroft Odell.....*Schenectady*..49 Parkwood Blvd
e Allen Adams Patterson.....*Glens Falls*.....Φ Δ Θ House
ee Gilberto Ratto.....*San Paulo, Braz*.....M. S. S. C.
s Harry S. Reynolds.....*Schenectady*.....12 Gillespie St.
ee Lloyd Nash Robinson.....*Lockport*.....Δ Υ House
ee Robert Bl nchard Shepard.....*Hudson*.....A Δ Φ House
e Edgar John Simmons.....*Glens Falls*.....K A Lodge
ee Howard Olwin Thorne.....*Yonkers*.....X Ψ Lodge
ee John Archie Hyde Torry.....*Cooperstown*.....Σ Φ Place
e Tulloch M. Townsend.....*Phelps*.....Φ Γ Δ House
ee S. Vernon Travis.....*Hale Eddy*.....S. S. S. C.
e Fremont L. Van Patten.....*Duanesburg*.....Duanesburg.
s Henry Edward Whiteside.....*So. Cambridge*.....Φ Δ Θ House
e Charles Leland Wood.....*Herkimer*.....Φ Γ Δ House
e Frank Wallace Yates.....*Fort Edward*.....750 Nott St.

Juniors—64.

Sophomores, Class of 1912

e Garfield V. R. Arthur.....*Keeseville*.....143 Nott Terrace
**e* Harry Randall Ballou.....*Rutland, Vt*...143 Nott Terrace
e Joseph Albert Barros.....*San Paulo, Braz*....N. S. S. C.
ls Chatfield Terry Bates.....*Schenectady*.....X Ψ Lodge
c John Beakley.....*Johnstown*.....Δ Φ House
e William Maser Beck.....*Buffalo*.....N. S. N. C.
e Leon Le Roy Biche.....*Black River*.....23 Jay St.
e Frank Colligan Buckley.....*Plattsburgh*.....B. I. W. Lodge
c Blaine Raymond Butler.....*Johnstown*.....Δ Φ House

e Russell Church Campbell.....*Niagara Falls*.....Δ Φ House
e George Raymond Chapman.....*Broadalbin*.....Δ Φ House
e Lawrence Sprague Churchill.....*Oswego*.....Σ Φ Place
e Ralph de Pomerait Clarke.....*Schenectady*.....1106 Nott St.
**e* Howard Elisha Cook.....*Franklin*.....Pyramid Club
e Harry Francis Coward.....*Buffalo*.....A Δ Φ House
s William Wallis Coykendall.....*Elmira*.....Ψ Υ House
e Robert Earle Dennis.....*Kalamazoo, Mich.*..A Δ Φ House
e Earle Devendorf.....*Schenectady*.....1228 State St.
**ls* James Manning Dunn.....*Schenectady*...340 Summit Ave.
e Walter Stratton Easterly.....*Gloversville*.....Δ Φ House
s Thomas Stanley Arnot Fairbairn.*Buffalo*.....A Δ Φ House
e Paul Fasoli.....*Glens Falls*.....Pyramid Club
s John Lyric Fisher.....*Buffalo*.....A Δ Φ House
e James Harry Griffin.....*Fort Edward*.....Φ Γ Δ House
s Irving Forrest Hand.....*Binghamton*.....Δ Υ House
e William Andrews Hardenbergh...*White Sulphur Spgs*..Δ Υ House
**e* Franklin Earl Hardy.....*Canterbury, N. H.*105 Barrett St.
c Edward Francis Hennelly.....*Johnstown*.....708 Huron St.
s Charles Louis Hequembourg.....*Schenectady*.....22 Gillespie St.
s Philip Toll Hill.....*Schenectady*.....1528 Union St.
e Walter Sinn Hoyt.....*Monterey, Mass*....A Δ Φ House
e Theodore Schuyler Ingham.....*Little Falls*.....Σ Φ Place
**e* Oscar Victor Johnson.....*Olean*.....N. S. N. C.
s Floyd Clinton Kelley.....*Walton*.....12 Gillespie St.
e Montgomery Ker.....*Jersey City*.....N. S. N. C.
e Arthur Lloyd Kniffen.....*West Coxsackie*.....1 Eagle St.
s Myron Edward Krueger.....*Schenectady*....R. F. D. No. 2.

e Fred Whitney Ladue.....*Troy*.....723 Nott St.
ls Myer Joseph Lavin.....*Albany*..17 Clinton St., Albany
s Edward Potter Lawsing.....*Schenectady*...405 Lafayette St.
s Alexander Hallenbeck Leamon...*Schenectady*.....836 Union St.
**e* Robert Henry Lowrie.....*De Land, Fla*....Pyramid Club
**s* Wallace Harmon Macmillan.....*Schenectady*...209 Seward Place
ls Allan Bernard Mann.....*Schenectady*...37 Glenwood Blvd
ts Arthur Daniel Mann.....*Schenectady*...37 Glenwood Blvd
e Walter John Mann.....*New York City*.....Δ Υ House
s Robert Paunee Marsh.....*Binghamton*.....864 Union St.
s John Gregory Martin.....*Niagara Falls*.....Φ Δ Θ House
s Edward Leo McDermott.....*Schenectady*.....129 Park Place
s Fred Francis McGauley.....*Schenectady*...812 Hamilton St.
e Paul Carney McQuaid.....*Webster, Mass*....Β Θ Π House
s John Mortimer Minuse.....*Port Chester*.....N. S. N. C.
e Amos Keller Munson.....*Herkimer*.....Φ Γ Δ House
s Milton John Neubauer.....*Schenectady*.....834 State St.
e William Francis O'Loughlin.....*Schenectady*.....5 Foster Ave.
s Frank Sidney Ostrander.....*Schenectady*.....Σ Φ Place.
e Alden Jesse Palmer.....*South Bethlehem*.....Δ Φ House
c Morris Palmer.....*Gloversville*.....Φ Δ Θ House
s Orla James Park.....*Sandy Hill*.....Χ Ψ Lodge
c Robert Porter Patterson.....*Glens Falls*.....Φ Δ Θ House
e David B. Peckham.....*Bainbridge*.....Pyramid Club
s Roy Webber Peters.....*Schenectady*.51 Washington Ave.
c James Henry Potter.....*Amsterdam*.....Χ Ψ Lodge
**c* John Edward Hall Randerson....*Albany*.....Α Δ Φ House
e William Allan Rice.....*Parksville*.....Β Θ Π House

e James Edwin Riley.....*Elmira*.....Ψ ϒ House
ls Leonard W. Ripton.....*Johnstown*.....Δ Φ House
e Alexander H. Robertson, Jr.....*Brooklyn*.....Δ ϒ House
e Fritz Kilean Ruprecht.....*New York City*.....Σ Φ Place
s Harry Roseboom Sawyer.....*Cherry Valley*.....X Ψ Lodge
c Henry Austen Schermerhorn.....*Schenectady*.....121 Park Place
s Arthur Wright Schuyler.....*Pattersonville*..223 McClellan St.
e Edgar Newton Scott.....*Schenectady*..513 Summit Ave.
e Frank Cady Sellnow.....*Albany*.....K A Lodge
e Joseph Bernard Shaw.....*Auburn*.....B. I. W. Lodge
**e* John Joseph Shea, Jr.....*Albany*.53 Westerlo St., Albany
c Raymond Dalton Shepard.....*Hudson*.....A Δ Φ House
e Fred Arthur Slade.....*Buffalo*.....K A Lodge
s Daniel Glen Smith.....*Schenectady*.53 Washington Ave.
e Howard Senica Smith.....*Gouverneur*.....B Θ Π House
e Waterman James Smith.....*Buffalo*.....K A Lodge
ls Ralph Louis Streever.....*Schenectady*.....1583 Union St.
e Ralph Hayford Tiebout, Jr.....*Brooklyn*.....A Δ Φ House
s Alexander Winfield Trainor.....*West Leyden*.....N. S. N. C.
e Horace Niles Trumbull.....*Hartford, Conn*.....K A Lodge
e Martin Emanuel Untermeyer.....*New York City*.....N. S. N. C.
e Jacob H. Van Aernam.....*Altamont*.....Φ Δ Θ House
c Kenneth Eastwood Walser.....*Cohoes*.....A Δ Φ House
e Bayard Boyd Webb.....*Fulton*.....X Ψ Lodge
s Philip Raymond Westcott.....*Seneca Falls*.....A Δ Φ House
c Chauncey Holmes Winters.....*Richmondville*...425 Liberty St.
**e* Grover Allen Woodard.....*Hadley*.....Φ Γ Δ House

Sophomores—92.

Freshmen, Class of 1913

ls C. Harry Anderson.....*Olean*.....623 Terrace Place
e Clifford Arnold.....*Peru*.....30 Fuller St.
e Horace Frederick Bethea.....*Dillon, S. C*.....X Ψ Lodge
e George Winants Blodgett, Jr.....*Rushville*.....505 Avenue A
e Raymond Hilton Bond.....*Washington, D. C*.121 Nott Ter.
e Edwin Purdy Bounton, Jr.....*Trumansburg*....605 Union St.
e James Ransom Braman.....*Port Chester*.....220 Avenue B
e Charles Francis Brate.....*Albany*.....7 Jackson Place
e Clarence Nicholls Bridge.....*Charlevois, Mich*....S. S. S. C
e Franklin H. H. Bryere.....*Racquette Lake*.623 Terrace Pl.
e John H. Burwell, Jr.....*Saratoga Springs*.66 Union Ave.
s Howard Tyler Case.....*Hartford*.....X Ψ Lodge
e Frederick Miller Champion.....*Clinton*.....Φ Δ Θ House
ls Giles Davis Clark.....*Albany*...572 Third St., Albany
e Willard Lathrop Clark.....*Schenectady*....18 Gillespie St.
e Kenneth P. Conover.....*Amsterdam*, 160 Spg. St., Amsdm.
e Samuel John Cook.....*Wallingford*.....Ψ ϒ House
e John C. Cronin.....*Glens Falls*....B. I. W. Lodge
s Henry Bryan Daly.....*Sandy Hill*....220 Avenue B.
e Alexander Lowe Darby.....*Troy*.....X Ψ Lodge
s Harry Lee Davenport.....*Scotia*..1 Mohawk Ave., Scotia
e Norman Alexander Davis.....*Schenectady*.....18 Regent St.
e Charles R. De Nyse.....*Mannet*.....703 Huron St.
e Hartley Greaves Dewey.....*Schenectady*.....College Hill
ls Harold H. Dickenson.....*Buffalo*.....S. S. S. C.
c Alexander Galt Duane.....*New York City*.....Σ Φ Place
e Eugene D. Filmore.....*Gloversville*...142 Nott Terrace

c David Roy Finley.....*Geneseo*.....303 Lenox Road
e Clarence Root Fischle.....*Buffalo*.....125 Park Place
e Herman Franck, Jr.....*Schenectady*....831 Grant Ave.
ls Arthur Friedman.....*Schenectady*.....418 Smith St.
e John Henry Gardner, Jr.....*Meadowdale*.....X Ψ Lodge
s De Forest Van Slyck Garnsey....*Schenectady*....231 Liberty St.
e Paul Giddings.....*Corfu*.....513 Smith St.
e Ernest T. Gilbert.....*Binghamton*.....783 Nott St.
e Lansing J. Gilmore.....*Salem*.....S. S. S. C.
e Frank B. Girard.....*Griffin*.....220 Avenue B.
e Edwin P. Grafft.....*Waverly*.....Ψ Υ House
e Warren Eaton Griffith.....*Albany*.....751 Nott St.
e John Jacob Guerard.....*Flat Rock, N. C*.....N. S. N. C.
e John Brackett Hague.....*Saratoga Springs*, 66 Union Ave.
s Clarence Wilson Hall.....*Luzerne*.....Φ Δ Θ House
e Lawrence Vandenburg Hall.....*Saratoga Springs*...Β Θ Π House
e Richard Keese Hallock.....*Stamford*.....N. S. N. C.
ls Theodore William Hanigan.....*Schenectady*.....938 State St.
c Frederick Staley Harris.....*Peekskill*.....Δ Φ House
e Charles Helm.....*Saratoga Springs*....Δ Φ House
e Bernard Herman.....*Newburgh*...1126 Eastern Ave.
ls William Humphrey.....*Hemlock*.....121 Nott Terrace
e Don King Hutchens.....*Pulaski*.....Α Δ Φ House
e Luther Glen Kerr.....*Adams Basin*.....Δ Υ House
e Walter Timothy Kerwin.....*Albany*.....751 Nott St.
s Henry H. Kimberly.....*Watervliet*.....Α Δ Φ House
e Joseph Kirchenbaum.....*Schenectady*...347 Maxon Road
e Norman Wolfred Kittson.....*St. Paul, Minn*.....Σ Φ Place

e Harold Joseph Kline.....*Schenectady*....36 Rugby Road
s Robert Francis La Barron.....*Binghamton*.....Δ ϒ House
e Richard Perkins Lent.....*Highland*.....Φ Δ Θ House
e William Johnson Lewis.....*Cohoes*.....K Λ Lodge
ls Victor Alexander Lord.....*Syracuse*.....147 Nott Terrace
e Russell E. Lowe.....*New York City*....Λ Δ Φ House
e Edmund Mabie.....*Highwood, N. J*....B Θ Π House
s Edward Lawrence Mack.....*Vergennes, Vt*.....Φ Δ Θ House
e Charles Thomas Male.....*Niskayuna*.....Niskayuna
c Hubert Mann.....*Schenectady*..37 Glenwood Blvd
e Charles Leon Marks.....*Pittsfield*.....21 Eagle St.
e Charles F. Masterson.....*Barton*.....Ψ ϒ House
ls Stephen Lorenzo Mayham.....*Schoharie*.....Δ Φ House
e DeWitt Kenneth McDonald.....*Schenectady*...32 Wendell Ave.
e Leland Rae McKnight.....*Salem*.....S. S. S. C.
e Joseph McMahon.....*Elmira*.....21 Park Place
e George T. McMullen, Jr.....*Amsterdam*.....B. I. W. Lodge
e Howard Menand.....*Albany*.....Δ ϒ House
s Thornton Allen Mills, Jr.....*Schenectady*....29 Wendell Ave.
e Ralph D. Morgan.....*Buffalo*.....Δ ϒ House
e Harry Edward Mull.....*Oneonta*.....19 University Pl.
e John Joseph Mullane.....*Unadilla*.....765 Nott St.
ls Charles Francis Murray.....*Albany*..96 Mad. Ave., Albany
c Alfred L. Oppenheim.....*New York City*.....Δ ϒ House
e Philip Noyes Riedinger.....*Elmira*.....Ψ ϒ House
s Douglass Dismore Riley.....*Elmira*.....Ψ ϒ House
s Thomas Rogers.....*Sandy Hill*.....X Ψ Lodge
c William Alexander Rogers.....*Yonkers*.....Σ Φ Place

e Wilber David Rose.....*Scotia*.....Scotia.
e James M. Roshirt.....*Albany*.....704 Huron St.
e John Atwood Royce.....*Liberty*.....Δ Υ House
e Isador Schulman.....*Schenectady*.....36 Foster Ave.
e John Stickney Shepherd.....*Saratoga Springs*..Β Θ Π House
e Charles Sherman.....*Albany*..271 Quail St., Albany
e Merle E. Simons.....*Friendship*.....21 Park Place
s Frank J. Smith, Jr.....*Albany*.....Φ Δ Θ House
ls M. Sutphen Somers.....*Johnstown*.....753 Nott St.
e Frank Leroy Spearman.....*Plattsburgh*....B. I. W. Lodge
e Konrad Stern.....*Clinton*.....623 Terrace Pl.
e Alexander Mills Stewart.....*Fonda*.....Ψ Υ House
e Jasper B. Stewart.....*Schenectady*.....68 Union Ave.
s John Trowbridge St. John.....*Binghamton*.....Σ Φ Place
e Fred Eugene Stockwell.....*Fitchburg, Mass*...Φ Γ Δ House
e High Montgomery Stoller.....*Schenectady*.....Χ Ψ Lodge
e Harold D. Sylvester.....*Fulton*.....130 Park Ave.
e Curtis Douglas Thomson.....*Glens Falls*...121 Nott Terrace
e Walter Von Dohlen Tiedeman....*Schenectady*....708 South Ave.
e Frederic D. Trapp.....*Hartford, Conn*.....Χ Ψ Lodge
e Franklin Peter Ulrich.....*Scotia*.....Scotia.
e Clyde Dirwain Utter.....*Oneonta*.....314 Hulett St.
e George Stuart Van Antwerp.....*Johnstown*.....765 Nott St.
s J. Wagner Van Auken.....*Schenectady*...128 Nott Terrace
s Arthur Hanson Van Deusen.....*Schenectady*.....218 Union St.
e Carl E. Vedder.....*Schenectady*.....223 Crane St.
e Carl William Veeder.....*Schenectady*...5 Waverly Place
e J. Bernard Wallace.....*Schenectady*..353 McClellan St.

e Milton George Wend.....*Albany*, 118 S. Pine Ave., Alby.
e Harry Frazer White.....*Phelps*.....Φ Γ Δ House
e Douglas Weare Whitney.....*Chicago*.....X Ψ Lodge
e Roy Cameron Whitney.....*Oswego*.....303 Lenox Road
e Joseph Wilcox, Jr.....*Athol, Mass*.....Φ Γ Δ House
e Arthur Ralph Wilson.....*Pattersonville*.....Δ Υ House

Freshmen—117.

Summary of Students, Union College

Candidates for the Master's Degree	12
Graduate Students	7
Seniors	53
Juniors	64
Sophomores	92
Freshmen	117
	345
Counted twice	1
Total	344

STUDENTS OF THE ALBANY MEDICAL COLLEGE

Fourth Year Class

William David Aldrich.....Wevertown
William Dewey Allen.....Rensselaer
Wallace Joseph Charles Aubry, M. D.....Montreal, Can.
Wardner Daniel Ayer.....Rensselaer
John Frederick Beiermeister.....Troy
George Bibby.....Pottersville
Claude Bledsoe.....Gloversville
Cornelius Joseph Buckley, A. B.....Pittsfield, Mass.
John Bennett Burke.....Troy
James Whitfield Byrne.....Troy
Frank Gibson Calder.....Freehold
Eugene Francis Connally.....Troy
Arthur George Cooke.....Johnstown
George Watson Dufty.....Troy
John Arthur Farrell, Jr.....Rensselaer
Richard Berchmans Gray.....Rensselaer
Henry Martin Grogan.....Glens Falls
Philip Conrad Hacker.....Albany
Elwin Wallace Hannock.....Albany
James Charles Hassall.....Troy
Patrick Joseph Hirst.....Mechanicville
William Knowlton Johnson.....Schodack Landing
Walter Scott Lilienthal.....Albany
Walter Edward Lundblad.....Schenectady.
John James McCall.....Albany

Harold McDonald.....Watervliet
Edward Bartholomew Manion.....Herkimer
Roy Jay Marshall.....Gouverneur
John James McShane.....Springfield Center
Howard Casper Murray.....Herkimer
Charles Frederick Myers.....Saratoga
Augustus Charles Post.....Catskill
George Bradford Randall.....Albany
Willard Tipple Rivenburgh.....Ghent
Leander George Rymph.....Ulster Park
Saul Joseph Selkin.....Albany
John Forrest Southwell.....Keene, N. H.
John Albert Sullivan.....Pittsfield, Mass.
Harold Augustus Traynor.....Brushton
Harry Franklin Van Loon.....Albany

Fourth Year Students—37.

Third Year Class

Martin Joseph A'Hearn.....Saratoga Springs
Antonio Martinez Alvarez.....San Juan, Porto Rico
La Verne Adelbert Bouton.....Fultonville
Milton Gardner Burch.....North Adams, Mass.
Michael Ercole De Luca.....Troy
Ray Manier Eaton.....North Adams, Mass.
Percy Henry Finch.....Broadalbin
Walter Clayton Fox.....Troy
Frederick Joseph Garlick.....Fall River, Mass.
Bertram Wesley Gifford.....Masonville

Clayton Longueville Gifford.....Valley Falls
George Mills Glenn.....Auriesville
James Joseph Hart.....Rensselaer
Irwin Johnson.....Watervliet
William Neely Keith, A. B..... Newton, Pa.
Frederick Louis Kreiker.....Troy
Arthur Krida.....Schenectady
Harold Arthur Lucas.....Rensselaer
Thomas William Maloney.....Waterloo
Charles Edward Maxwell.....Saratoga
William Edward McCormick.....Albany
William Thomas McCormick.....Greenwood
John Ashley McElwain.....Cohoes
Maurice James McGrath.....Ogdensburg
Walter Daniel McKenna.....Troy
Horace Clifford Montgomery.....Waddington
Frank Mathias Neuendorf.....Albany
Henry Joseph Noerling .....Albany
Edmond Joseph O'Donnell.....New York
Abraham Lewis Olshansky.....Albany
Chauncey Butler Packard.....Troy
Ralph Baker Post.....Catskill
Peter Francis Purcell.....Salem
Francis Bernard Quinlan.....Glens Falls
William Francis Rafferty.....Rensselaer
Hyram Burdette Riggs.....Canajoharie
Scott Booth Schleiermacher.....Bloomingburg
Emil John Senn.....Schenectady

William Thomas Shields, Jr.....Albany
William James Sweeney.....Newburg
Abraham Phineas Terk.....Glens Falls
Arthur Eddy Wells.....Schenectady
Arthur Hastings Wheeler.....Troy
Melvin Thomas Woodhead.....Amsterdam

Third Year Students—44.

Second Year Class

Max Alonzo Almy.....Corning
Horace Edward Auringer.....Cohoes
Bertran Truman Baker.....Warrensburg
Clifton Bogardus.....Catskill
John Lawrence Both.....Lawrence
Joseph Henry Bowers.....Albany
William Bertram Butts.....Albany
John Joseph Cahill.....Sandy Hill
Rufus Baker Manley Crain.....Richfield Springs
Alton Brooks Parker Daley.....Coxsackie
Sol Charles Davidson.....Rochester
John Lounsberry Edwards.....Randall
Louis Marcus Friedman.....Bayonne, N. J.
George Augustine Green.....Mechanicville
Paul Pattengill Gregory.....Welcome
Walter Robert Grunewald.....Gloversville
John Duncan Gulick.....Cranbury, N. J.
Vasileos Michael Koundourianes, B. A.....Albany
Royal Esterbrooks LaGrange.....East Beekmantown

Albert Lentz.....Johnstown
Norman Howe Liberty.....Ticonderoga
Charles Immanuel Loeble.....Troy
William Edgar Lowe, Jr.....Catskill
Donald Angus MacDuffie.....Olean
Domenico Carlantonio Mauro.....Gloversville
Joseph Ambrose McPhillips.....The Glen, Glens Falls
Abraham Metzner.....Glens Falls
Ward Winthrop Millias, Ph. B.....Castleton-on-Hudson
James Henry Mitchell, Jr.....Cohoes
Floyd Hazard Moore.....Herkimer
Clarence Edmund Mullens.....Albany
Homer Hollett Oaksford.....Gloversville
Daniel Francis O'Keeffe.....Hadley
Daniel von Tobiase Read.....Monck's Corner, S. C.
Fred Lester Ritter.....Albany
Michael Augustine Rogers.....Schuylerville
William Henry Seward.....Amsterdam
George Aaron Sharp.....Westfield, Mass.
Charles Edward Stott.....Albany
Sterling Wallace Todd .....Hyde Park, N. J.
William Trotter.....Troy
James John Walsh.....Waterloo
Floyd Alberti Weed.....Catskill
Jerry West.....Gallupville
Gra Joudict Whitehead, Jr.....Albany
Charles Wesley Woodall.....Delmar

Second Year Students—45.

First Year Class

William Alfred Ackroyd ..... Albany
Wesley Mason Adams ..... Westford
Glen Beecher ..... Granville
Morris Bryan Beecroft ..... Schaghticoke
Orvis Acloviram Brenenstuhl ..... Petersburg
Darwin Alfred Bruce ..... Albany
John Leonard Byrnes ..... Schenectady
Daniel Francis Carmody ..... Albany
William Henry Casey ..... Troy
Garrett Marcellus Clowe ..... Schenectady
Clarence Cohen ..... Hempstead
Nathaniel Crost ..... Saratoga Springs
Burke Diefendorf ..... Fort Plain
Jacob Drooz ..... Albany
Dwight Guilford Dudley ..... Maine
Harold La Forrest Ellis ..... Westfield, Mass.
Charles Optimus England ..... Utica
Albert Stuart Ferguson ..... Schenectady
Hugh Vincent Foley ..... Watervliet
George Victor Genzmer ..... Pittsfield, Mass.
Elmer Ray Gladstone ..... Shavertown
Hugh Sewell Gregory ..... Horseheads
Edward Bowen Houghton ..... Albany
Guy Swineburne Houghton, A.B. ..... Albany
Harry Smith Howard ..... Albany
Alson Joy Hull ..... Williamstown, Mass.
Eugene Fellner Hull ..... Berlin

Ray Holly Humphrey.....Rensselaer
Florizel Janvier.....Tinmouth, Vt.
William James Jones.....Amsterdam
Whitney Hotaling Joyce.....Unadilla
Donald Harvey Kinloch.....Troy
Clarence Giles Kirby.....Nassau
William Herman Ladue.....Beekmantown
Roy Ludlum Lippincott.....Campbell Hall
John Wellington Mambert.....Churchtown
Schuyler McCulloch Martin.....Albany
Raymond Francis McAloon.....Keeseville
James McDermott, Jr.....Schenectady
John Devring McGuire.....Arctic, R. I.
Vincent Martin Myers.....Mechanicville
Michael Edward Nolan.....Eagle Bridge
Henry Bernard O'Keeffe.....Luzerne
Elmer Harrison Ormsby.....South Glens Falls
John Stewart Parker.....Oneonta
Robert Edward Plunkett.....Troy
William Carl Rausch, Jr.....Albany
Conrad Alogisius Rissberger.....Albany
Ernest Charles Schultz.....Schenectady
Woodard Shaw.....West Hebron
Walter Joseph Smith.....Port Leyden
John Michael Sullivan.....Long Lake
Axel Fridolf Swanson.....Southampton, Mass.
Harry John Tate.....Pittsfield, Mass.
John Daniel Tidabeck.....Bloomfield, N. J.

Harold Filkins Timmerman.....Amsterdam
Harold Dwyer Tobin.....Chateaugay
Guy Brownell Van Alstyne.....Canajoharie
William Irving Walsh.....Troy
Frank John Williams.....Utica
Bartlett Rich Willson.....Albany
Willard Elmer Wheelock.....Canajoharie
Louis Frederick Yavits.....Schenectady

First Year Students—60.

Summary of Students, Albany Medical College

Fourth Year Students	40
Third Year Students	44
Second Year Students	46
First Year Students	63
Total	193

STUDENTS OF THE ALBANY LAW SCHOOL

Seniors

George W. Allen.....Schenectady
Charles H. Andrews.....Albany
Walter Samuel Archibald (Colgate).....Hamilton
James Armstrong .....Sonora
Bertram N. Aufsesser.....Albany
Frederick A. Beckwith.....Glens Falls
O. Bryan Brewster (Syracuse U.).....Lake Placid
Henry Bush .....Horseheads
Joseph Caplan .....Albany
Charles L. Canton.....Newtonville
Robert L. Cockran.....Miami, Fla.
Norman W. Cole.....New York City
Arthur R. Conway.....Albany
Harold H. Corbin.....Saratoga
Edward J. Crummey (Georgetown U.).....Albany
A. Edgar Davies (Union).....Schenectady
Loye T. Durand.....Frewsburg
Leon M. Ellithorpe.....Minot, S. D.
Walter G. Evans (Cornell).....Rome
George M. Fayles.....Troy
Ida M. Fearson.....Morrisville
Ezra S. Ford.....La Forgeville
Morris N. Friedland.....Albany
Charles J. Fuess.....Utica
Andrew L. Gilman (Cornell).....Groveland Sta.

Howard A. Glassbrook.....Stony Creek
William Goldberg .....Albany
Leslie P. Grant.....Stamford
Edward K. Haas.....Poughkeepsie
Thomas T. Hill.....Albany
Thomas F. Hurley.....Warrensburg
William Hurst, Jr.....Hurstville
Duncan B. Kaye.....Troy
Worden W. Kelly.....Saratoga
Arthur Beach King (Union).....Troy
Melvin Kinkley .....Orleans Four Corners
Stuart G. Knight.....Round Lake
Louis E. Krohn.....Utica
William S. Lawton.....Cambridge
E. Gordon Lee.....Rochester
Charles Lash .....Andover
James M. A. McCloskey (St. Francis Xavier)....Auriesville
Charles A. McGuire, Jr.....Arctic, R. I.
Samuel J. McMillan (Cedarville, Col.).....Delanson
Walter S. McNab (Union).....Schenectady
Jolin J. Mitchell.....Marlborough, Mass.
John L. Mouringham (Mt. St. Mary's Church)....Arctic, R. I.
Herman Mezner .....Glens Falls
John F. O'Brien.....Port Gibson
Edward R. Payher.....Troy
E. Adorno Peck .....Troy
Phillip M. M. Phelps.....Fair Haven, Vt.
Robert F. Pierce.....Albany

Camille Poulin ..... Rutland, Vt.
Robert C. Poskanzer ..... Albany
Leo E. Pratt (Williams) ..... Portland, Me.
Justin V. Purcell ..... Albany
C. Bernard Race ..... Albany
William G. Regan ..... Marlborough, Mass.
Harry Rosenberg ..... Rochester
Charles F. Saunders ..... Rochester
Alexander T. Selkirk ..... Albany
George B. Smith ..... Camden
Richard Wallace Smith ..... Patchogue
Samuel Everett Taylor ..... Penn Yan
George C. Terry, Jr. (St. Lawrence U.) ..... Southold
Frank E. Van Olinda (Union) ..... Schenectady
John C. Watson ..... Albany
Benjamin A. Wickham ..... Hector

Seniors—69

Juniors

Alexander Aaronson (C. C. N. Y.) ..... Albany
Isadore Bookstein ..... Albany
Charles S. Briggs ..... Canastota
Bert. Brower (Cornell) ..... Palatine Bridge
Philip J. Cirilla ..... Troy
James A. Clark ..... Rutland, Vt.
Francisco F. Coca (Inst. Havana) ..... Havana, Cuba
Charles G. Coffin, 2nd ..... Catskill
Hazel M. Cole ..... Springfield, Mass.

Martin Croissant ..... Albany
Raymond C. Donnan (Union) ..... Schenectady
Frank J. Duffy ..... Providence, R. I.
Frank T. Dwyer ..... Cazenovia
Arthur S. Evans (Hamilton) ..... Delta
C. Roscoe Failing (Union) ..... Palatine Bridge
José A. Fajardo ..... Porto Rico
Pascacio Fajardo ..... Porto Rico
Benjamin F. Feinberg ..... Altona
Newton H. Fessenden ..... Kingston
Chauncey S. Fish ..... White Plains
Nelson A. Foote ..... Pittsfield, Mass.
Benjamin H. Freeman ..... Mt. Vernon
Lynn G. Goodnough ..... Cornwall
Charles E. Gostenhofer (Trinity) ..... New York City
Charles W. Gould ..... Milford, Mass.
Doane S. Guardenier (Union) ..... E. Springfield
Woodward W. Guile ..... Utica
E. A. Hamblin ..... Albany
Neil G. Harrison ..... Green
J. D. Henderson, Jr ..... Troy
Milton B. Ignatius ..... Troy
J. Smith Jacobs ..... Troy
John E. Kelly ..... Schenectady
Mitchell A. Kohn ..... Schenectady
James W. Liddle ..... Duanesburg
Daniel E. Lorentz ..... Gloversville
Emil F. Maley (Wash. & Lee) ..... Braddock, Pa.

E. A. Mapes.....Birdsall
J. Russell Meany.....Albany
Francis L. McCormack (U. of Pa.).....Troy
Charles F. McMahon.....Schuylerville
Joseph B. Mulholland.....Troy
Loomis W. Mulford.....Unadilla
James R. Murray.....Albany
J. Carroll Niles.....Schenectady
Thomas C. Nixon.....Rochester
Ray W. Northrup.....Morrisville
Jonathan Pearson (Union).....Hudson
Albert S. Poventud (U. of Va.).....Ponce, Porto Rico
Nicholas G. Powers.....Utica
W. Veeder Putnam.....Fonda
Halsey L. Race.....Rochester
Samuel Reichler.....Utica
Hugh Reilly (Georgetown U.).....Albany
F. J. Roberts.....Atlantic, Ia.
Joseph E. Salichs (Spanish Inst.).....New York City
Carl S. Salmon.....Potsdam
Arthur B. Shear.....Catskill
Francis L. Smith.....Schenevus
Garrett W. Timmers.....Castleton
Harold W. Turner.....Waterford
Alvin Ury (Union).....Schenectady
Ralph J. Ury (Union).....Schenectady
Vernon A. Vrooman.....Albany
Wayne H. Whitman.....Washington, R. I.

W. T. Whittemore.....Albany
Harry E. Winn.....Greenfield, Mass.
Juniors—67

Summary of Students, Albany Law School

Seniors	69
Juniors	67
Total	136

STUDENTS OF THE ALBANY COLLEGE OF PHARMACY

Senior Class

Roy Irving Bauder.....Johnstown
Leopold Branche .....Gloversville
H. Hardin Clow.....Coxsackie
Harold Way Cole.....So. Shaftsbury, Vt.
George V. Daily.....Mechanicville
Harold S. Eggens.....Cohoes
Charles Thomas Eldridge.....North Creek
Ellis William Eldridge.....Glens Falls
Edward Bernard Finn.....Sandy Hill
Michael Giaguinto .....Albany
Walter John Joseph Hope, Jr.....Schenectady
William Henry Jacobs.....Trout Creek
Guy Walter Knapp.....Dolgeville
Philip Joseph Krank.....Albany
Dana William Lawrence.....Syracuse
Walter Earl Lawrence.....Waterford
Thomas Ernest Lee.....Schenectady
Charles George Mailloux.....Watervliet
Charles Ignatius McCarty.....Pittsfield, Mass.
John Stoddard McCormick.....Albany
Paul Alonzo Mead.....Schenectady
Arthur John Merriman.....Summer Hill
George Augustin Molony.....Schenectady
Leon Merle Randall.....Oswego

Harry Eugene Robie.....Eaton
George Washington Saxe.....Catskill
Seth Earl Shanks.....Albany
Daniel J. Shea.....Hoosick Falls
William Augustus Snyder.....Mechanicville
James Herbert Spencer.....Parish
Douglas Reynolds Spiers.....Walton
Frank Genung Thompson.....Plattsburg
Thomas O'Neil Vincent.....Greenville
Clarence Robert Whitaker.....Albany

Seniors—34

Junior Class

Samuel Aker .....Albany
Harry Wheeler Baker.....Glens Falls
Roy Edward Baker.....Potsdam
Charles Hamblin Barbow.....Mechanicville
Archibald Walling Billings.....Stowe, Vt.
August John Richard Bolje, Jr.....Johnstown
Leon Holmes Bovham.....Tioga Center
Thomas James Brierton.....Watervliet
Michael Butler .....Albany
Harry Payne Clark.....Holyoke, Mass.
William Clements, Jr.....Ballston Spa
William Henry Covey.....Chatham
Harold John Cusson.....Hoosick Falls
Floyd Ivan Davey.....Parish
William Jay Dromey.....Canton

Doms Du Rose.....Ticonderoga
Bernard Ellinger .....Schenectady
John Joseph Goodhart.....Ogdensburg
George Theodore Gramps.....Hudson
Henry Groos .....Johnstown
Edward Joseph Hamman.....Schenectady
Percy Irving Hisert.....Schenectady
William Albert Humphries.....Delhi
Frank Wesley Isles.....Mechanicville
William Guier Kapp.....Rensselaer
Francis Augustus Keenan.....Albany
John Charles Komiozny.....Schenectady
Daniel Henry Krieger.....Poughkeepsie
Walter Henry Lathrop.....Schenectady
Harry Robert Lawrence.....Albany
William Morehead Lithgow.....Albany
Richard Lownsbery .....Kingston
Henry William McManaway.....Hoosick Falls
Frederick Thomas Morse.....Auburn
Daniel Louis Myers.....Schenectady
Bernice Leon Nichols.....Essex Junction, Vt.
Arthur William Northover.....Johnstown
Clarence Edward Ostrander.....Albany
John Wesley Pangburn, Jr.....Rensselaer
Louis Clemest Potter.....Chestertown
William Vincent Reelly.....Penn Yan
John Harry Robbins.....Kellettville, Pa.
Fred Salvione .....Amsterdam

Claud Hamilton Selleck.....Ontario
Helen Florentine Sheehy.....Little Falls
Henry Cyrus Sherman.....Oneonta
Manser Templeton Stone.....Northfield, Vt.
Henry Hiscox Swink.....Troy
Guy Brownell Van Alstine.....Canajoharie
Theodore DeWitt Wands.....Norwich
Willard Samuel Warren.....Johnstown
Cyrus Grant Watson.....Homer
Carl Augustus Weber.....Kingston
Ida Fescher Weber.....Kingston
Sidney Arthur White.....Windsor

Juniors—55

Summary of Students, College of Pharmacy

Seniors	34
Juniors	55
Total	89

SUMMARY OF STUDENTS, UNION UNIVERSITY

Union College	344
Albany Medical College	193
Albany Law School	136
Albany College of Pharmacy	89
	762
Counted twice	3
Total	759

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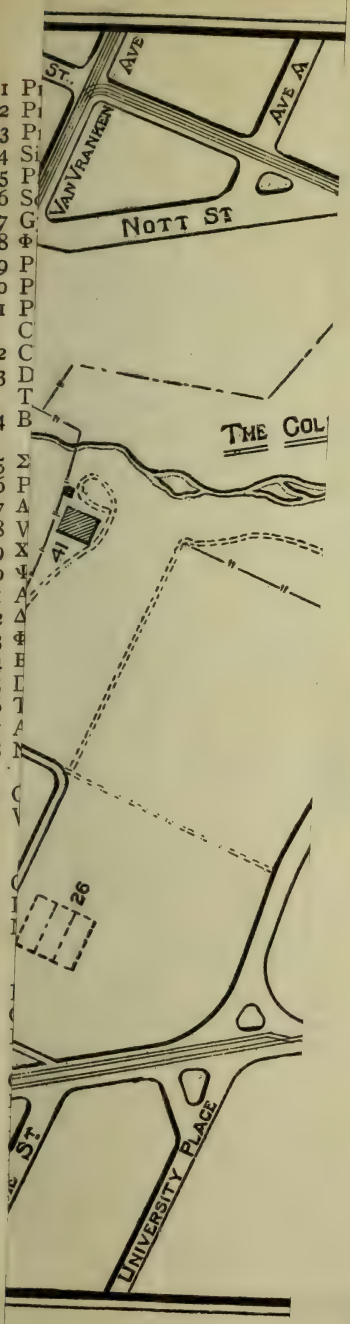
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UNIVERSITY PLACE

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10 Prof. Hale
11 President's Office
Classrooms
12 Chapel
13 Dean's Office
Treasurer's Office
14 Biological Laboratory
(second story)
15 Σ Φ Place
16 Prof. Ashmore
17 Δ Δ Φ House
18 Wells House
19 X Ψ Lodge
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22 Δ Υ House
23 Φ Γ Δ House
24 Β Θ Π House
25 Dean Ripton
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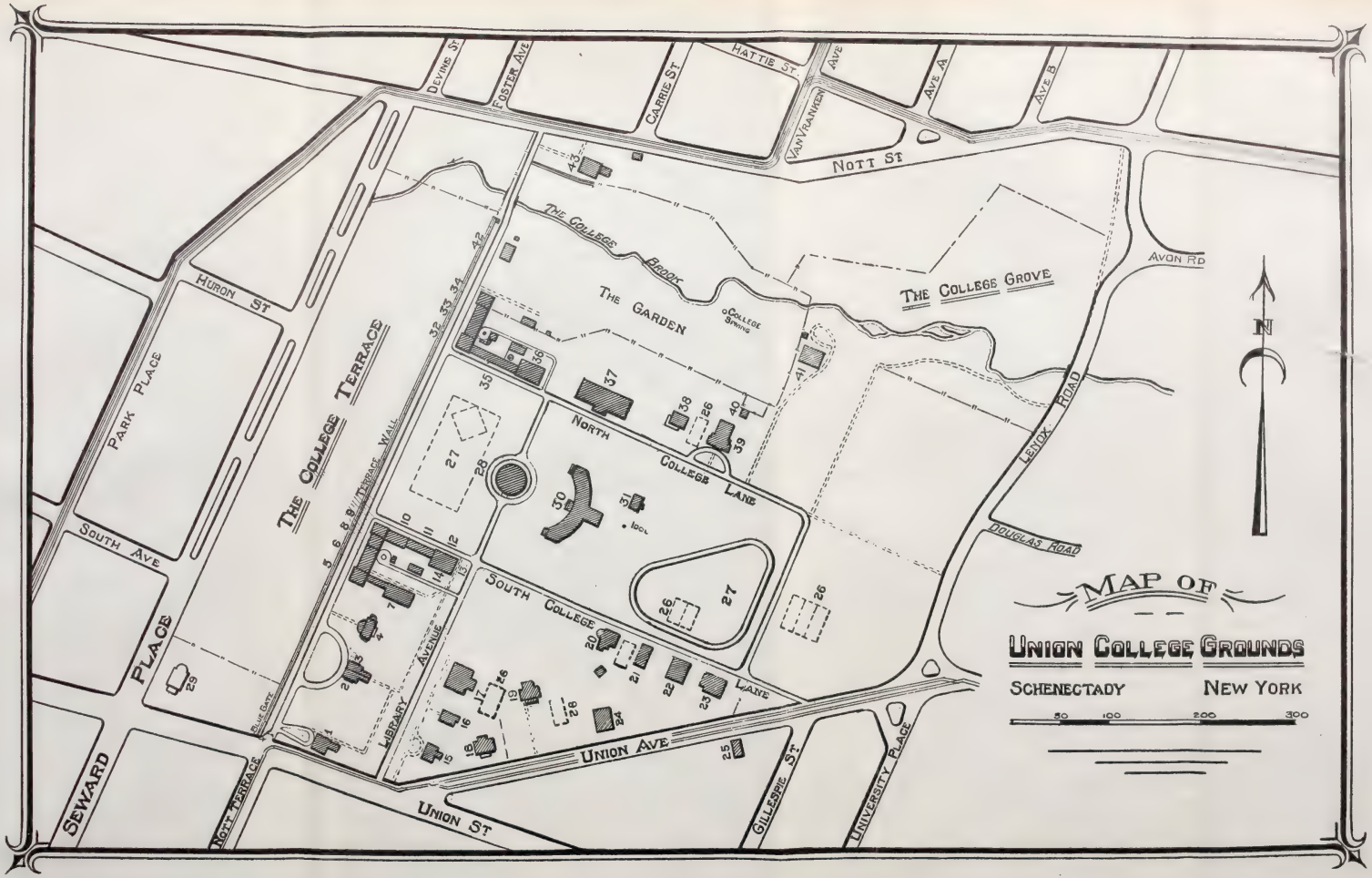
32 Prof. Bennett
33 North College Dormitory
Pyramid Club
B I W Fraternity
34 Prof. McKean
35 Chemical Laboratory
36 Physics Laboratory
(second story)
37 General Eng'ng Building
38 K A Lodge
39 Electrical Eng'ng Lab.
40 Caretaker's House
41 Barn
42 Benedict House
43 Prof. Landreth



ANNUAL CATALOGUE

OF

UNION UNIVERSITY

1910-1911

PRESS OF
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ALBANY, N. Y.

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UNION UNIVERSITY

Union University embraces the following institutions:

UNION COLLEGE, Founded 1795

Academic Department	Classical Course Latin Scientific Course Scientific Course
Engineering Department (Founded 1845)	General Engineering Course Sanitary Engineering Course Electrical Engineering Course

ALBANY MEDICAL COLLEGE, Founded 1838
ALBANY LAW SCHOOL, Founded 1851
DUDLEY OBSERVATORY, Founded 1852
ALBANY COLLEGE OF PHARMACY, Founded 1881

Union College acquired by its charter, granted in 1795, full university powers, but the creation of graduate institutions at Schenectady was not found practicable. Schools of law and medicine and also an astronomical observatory have long existed at Albany, only a few miles distant. The arrangement naturally suggested by these circumstances was, that the professional schools and the observatory at Albany should be united with Union College, under the charter and board of trustees of the latter. This was accordingly effected by the incorporation of Union University in 1873. The Albany College of Pharmacy was created by the board of governors, June 21, 1881, and incorporated as a department of the university, August 21 of the same year.

The president of Union College and permanent chancellor of Union University has the oversight of the university, each of the institutions having its resident dean. The dean of Union College acts in the place of the president in his absence and also assists him in matters delegated to him by the president. The university board of governors is composed of permanent trustees of Union College and of representatives of each of the other institutions embraced in Union University.

1910—UNIVERSITY CALENDAR—1911

1910

Fall term of Union College begins.....Monday, September 19
First semester of Law School begins.....Tuesday, September 20
Winter term of Medical College begins...Tuesday, September 20
Winter term of College of Pharmacy begins..Monday, October 3
Election day—recess.....Tuesday, November 8
Thanksgiving day—recess.....Thursday, November 24
Fall term of Union College ends.....Thursday, December 22

Christmas recess in all departments.

1911

Sessions resumed.....Monday-Wednesday, January 2-4
Day of prayer for colleges.....Thursday, January 26
First semester of Law School ends .....Friday, February 3
Second semester of Law School begins ....Monday, February 6
Washington's birthday—recess.....Wednesday, Febuary 22
Winter term of Union College ends.....Saturday, March 25
Spring term of Union College begins.....Monday, March 27
Easter recess.....Thursday-Monday, April 14-17
Commencement week, Union College
Sunday-Wednesday, June 11-14
Entrance examinations, Union College
Thursday-Friday, June 15-16
Fall term of Union College begins.....Monday, September 18
First semester of Law School begins....Tuesday, September 19
Winter term of Medical College begins....Tuesday, September 19
Winter term of College of Pharmacy begins..Monday, October 2
Election day—recess.....Tuesday, November 7
Thanksgiving day—recess.....Thursday, November 30
Fall term of Union College ends.....Thursday, December 21

For calendars of departments, see pages 23, 159, 170, 177.

OFFICERS OF THE UNIVERSITY

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Honorary Chancellor, 1910

COUNT JOHANN HEINRICH VON BERNSTORFF, LL. D.

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ALDEN CHESTER.....Albany

Albany Law School

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J. NEWTON FIERO, LL. D.....Albany

Dudley Observatory

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BENJAMIN WALWORTH ARNOLD.....Albany

Albany College of Pharmacy

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CHARLES NEWMAN.....Albany

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Assistant in Dudley Observatory

JAMES F. ROONEY, M. D.
Lecturer on Hygiene and Instructor in Medicine

HOWARD E. LOMAX, M. D.
Lecturer and Assistant Demonstrator in Anatomy

GEORGE G. LEMPE, M. D.
Lecturer on Anatomy and Instructor in Surgery

LA SALLE ARCHAMBAULT, M. D.
Lecturer on Neurology

ARTHUR F. HOLDING, M. D.
Lecturer on Radiography

WILLIAM A. LARKIN, M. D.
Lecturer on Inorganic Chemistry, and Instructor in Organic Chemistry
Assistant to the Registrar

JAMES N. VANDER VEER, M. D.
Lecturer on Surgical Technic and Instructor in Genito-Urinary Surgery

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Lecturer on Ophthalmology and Otology

JAMES WESLEY WILTSE, M. D.
Lecturer on Dermatology and Genito-Urinary Diseases

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Instructor in Surgery

EDGAR R. STILLMAN, M. D.
Instructor in Physiology

HARRY W. CAREY, M. D.
Instructor in Physical Diagnosis

EDWIN C. HUTMAN, PH. G.
Director of Pharmaceutical Laboratory

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Instructor in Theory and Practice of Medicine

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Assistant in Dudley Observatory

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Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

GEORGE E. BEILBY, M. D.
Instructor in Surgical Pathology

BRANSON K. DE VOE, M. D.
Instructor in Anatomy

EUGENE E. HINMAN, M. D.
Instructor in Diseases of the Throat and Nose

JOHN H. GUTMANN, M. D.
Instructor in Surgery and Obstetrics

MALCOLM DOUGLAS, M. D.
Instructor in Histology and Physical Diagnosis

CLINTON B. HAWN, M. D.
Instructor in Clinical Microscopy

ERASTUS CORNING, M. D.
Instructor in Theory and Practice of Medicine and Physical Diagnosis and Demonstrator of Anatomy

ALBERT S. EASTMAN, B. S.
Instructor in Chemistry

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

LEROY S. BLATNER, D. D. S.
Instructor in Oral Pathology

JOSEPH L. DONHAUSER, M. D.
Instructor in Surgery

WILLIAM KIRK, M. D.
Instructor in the Anatomy and Physiology of the Nervous System

WALTER A. REYNOLDS, M. D.
Instructor in Anatomy, Prosector of Anatomy, and Assistant Curator of the Museum

JEROME MEYERS, M. B.
Instructor in Gastro-Enteric Diseases

JARED W. SCUDDER, A. M.
Instructor in Latin

MORTON C. STEWART, PH. D.
Instructor in Modern Languages

EUGENE F. PARKER, M. A.
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Instructor in Civil Engineering

JAMES K. HOWE, B. S., C. E.
Instructor in Engineering

MEADE L. ZIMMER, A. M.
Assistant in Dudley Observatory

RICHARD A. LAWRENCE, M. D.
Instructor in Obstetrics

HARRY S. BERNSTEIN, M. D.
Instructor in Histology, Pathology and Bacteriology

HAROLD P. SAWYER, M. D.
Instructor in Clinical Microscopy

THEOBALD F. DOESCHER, M. D.
Instructor in Physiological Chemistry and Gastro-Enteric Diseases

WILLIAM A. BING, M. D.
Instructor in Physiological Chemistry and Experimental Physiology

NELSON K. FROMM, M. D.
Instructor in Obstetrics and Materia Medica

TIFFANY LAWYER, M. D.
Instructor in Gynecology

EDWIN L. DRAPER, M. D.
Instructor in Surgery

WILLIAM G. KEENE, M. D.
Instructor in Diseases of Throat and Nose

WILLIAM A. LARKIN, PH. G.
Instructor in Physics and Chemistry

SPENCER L. DAWES, M. D.
Instructor in Microscopy and Pharmacognosy

WARREN L. BRADT, PH. G.
Lecturer on Pharmaceutical Jurisprudence

WILLIAM W. GIBSON, PH. G.
Instructor in Commercial Pharmacy

ROSCOE F. SANFORD, A. B.
Assistant in Dudley Observatory

ELLIS KELLERT, M. D.
Assistant in Pathology and Bacteriology

WALTER E. LUNDBLAD, M. D.
Assistant in Pathology and Bacteriology

LEROY JENKINS, A. B.
Assistant in Dudley Observatory

LEROY Z. MEARNS, C. E.
Assistant in Dudley Observatory

UNION COLLEGE

Union College was incorporated by the Regents of the University of the State of New York on the 25th day of February, 1795. It was the second college incorporated in the state, and the first north of the city of New York and west of the Hudson River. It received its name from the circumstance that several religious denominations co-operated in its organization, and it was the first college in the United States which was not of a strictly denominational character. It has continued from its foundation to be a representative institution of Christian unity.

The first president of Union College was the Rev. John Blair Smith, of Philadelphia. He was elected in 1795, and resigned in 1799, only a few months before his death. He was succeeded by Johnathan Edwards, the younger, who died in 1801. The Rev. Jonathan Maxcy, previously president of Brown University, succeeded Dr. Edwards, and resigned at the end of two years. In 1804 the Rev. Eliphalet Nott was elected president of Union College, which office he held until his death, on the 29th day of January, 1866. The Rev. Laurens P. Hickok, a graduate of the college, who had long acted as vice-president, was elected his successor. He resigned in 1868. The Rev. Charles A. Aiken succeeded Dr. Hickok in 1869, and resigned in 1871. The Rev. Eliphalet Nott Potter was elected president in 1871, and inaugurated June 20, 1872. On his resignation, in 1884, the Hon. Judson S. Landon was appointed president *ad interim,* and served until the inauguration of Harrison E. Webster, who was elected president May 23, 1888, and inaugurated June 26, 1888. On his resignation, in January, 1894, Rev. Andrew V. V. Raymond was elected president, and inaugurated in June, 1894. Dr. Raymond resigned July 18, 1907, and the Rev. George Alexander was appointed president *ad interim.* On January 28, 1909, Rev. Charles Alexander Richmond was elected president. Dr. Richmond was inaugurated June 7, 1909.

1910

	S	M	T	W	T	F	S
Sept.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
	..	..	..	..	..	..	..
	..	..	..	..	..	..	1
Oct.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..

	S	M	T	W	T	F	S
Nov.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	..	..	..
	..	..	..	..	..	..	..
	..	..	..	..	1	2	3
Dec.	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
	..	..	..	..	..	..	..

1911

	S	M	T	W	T	F	S
Jan.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
	..	..	..	..	..	..	..
	..	..	..	1	2	3	4
Feb.	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	..	..	..	..
	..	..	..	..	..	..	..
	..	..	..	1	2	3	4
Mar.	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
	..	..	..	..	..	..	..
	..	..	..	..	..	..	1
Apr.	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
	..	..	..	..	..	..	..
	..	1	2	3	4	5	6
May	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
	..	..	..	..	..	..	..
	..	..	..	..	1	2	3
June	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
July	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
	..	..	..	..	..	..	..
Aug.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
	..	..	..	..	..	..	..
	..	..	..	..	..	1	2
Sept.	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	..	..	..	..	..	..	..
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Oct.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
	..	..	..	..	..	..	..
	..	..	..	1	2	3	4
Nov.	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
	..	..	..	..	..	..	..
	..	..	..	..	..	1	2
Dec.	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..

Figures in heavy type indicate days on which Union College is in session

UNION COLLEGE CALENDAR

1910

Examinations for conditioned students...Saturday, September 17
Registration day for freshmen.....Monday, September 19
Entrance examinations begin.....Tuesday, September 20
Registration of three upper classes....Wednesday, September 21
Entrance examinations concluded.....Wednesday, September 21
First chapel exercises and recitations....Thursday, September 22
Senior reception to entering students.....Friday, September 23
Election day—recess .....Tuesday, November 8
Thanksgiving day—recess.....Thursday, November 24
Examinations for conditioned students...Saturday, December 3
Fall term ends.....Thursday, December 22

1911

Registration day for students, winter term....Monday, January 2
Recitations begin.....Tuesday, January 3
Allison-Foote prize debate.....Friday, January 13
Day of prayer for colleges.....Thursday, January 26
Washington's birthday.....Wednesday, February 22
Examinations for conditioned students.....Saturday, March 4
Winter term ends.....Saturday, March 25
Registration day for students, spring term....Monday, March 27
Recitations begin.....Tuesday, March 28
Easter recess.....Thursday-Monday, April 14-17
Selection of junior and sophomore orators....Saturday, April 15
Examinations for conditioned students.....Saturday, May 6
Presentation of prize essays.....Monday, May 15
Senior examinations end.....Friday, May 26
Memorial day.....Tuesday, May 30
Spring term examinations end.....Saturday, June 10
Baccalaureate sermon.....Sunday, June 11
Prize oratory of juniors and sophomores.....Monday, June 12
Meeting of trustees, societies, alumni.....Tuesday, June 13
President's reception.....Tuesday, June 13
Commencement, second Wednesday in June..Wednesday, June 14
Entrance examinations.....Thursday-Friday, June 15-16

Fall term, 1911-12, begins.....Monday, September 18

TRUSTEES OF UNION COLLEGE

Ex-Officio.

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Hon. HORACE WHITE, Lieutenant-Governor
Hon. SAMUEL S. KOENIG, Secretary of State
Hon. CLARK WILLIAMS, Comptroller
Hon. THOMAS B. DUNN, Treasurer
Hon. EDWARD R. O'MALLEY, Attorney-General

SILAS B. BROWNELL, LL. D., 71 Wall street, New York

Hon. EDWARD W. PAIGE, LL. D., 46 Cedar street, New York

Rev. GEORGE ALEXANDER, D. D., 47 University place, New York

Hon. WARNER MILLER, LL. D., Herkimer

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EDWIN W. RICE, Ph. D., Sc. D., Schenectady

EDWARD P. WHITE, A. M. Buffalo

CHARLES E. SPRAGUE, Ph. D., Union Dime Savings Bank, 701 Sixth avenue, New York

EDGAR S. BARNEY, Sc. D., 36 Stuyvesant street, New York

WILLIAM F. HAVEMEYER, 32 Nassau street, New York

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CHARLES B. McMURRAY, Troy, term of office expiring June, 1911

G. HARWOOD DUDLEY, Johnstown, term of office expiring June, 1912

FREDERICK W. CAMERON, A. M., Albany, term of office expiring June, 1913

WILLIAM PLATT ADAMS, A. B., Red Hook, term of office expiring June 1914

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Frank Bailey, Art. D.

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Willis T. Hanson

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Instructor in Electrical Engineering

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EUGENE F. PARKER, M. A.
Instructor in Modern Languages

CHESTER H. YEATON, A. M.
Instructor in Engineering Mathematics

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

JAMES K. HOWE, B. S., C. E.
Instructor in Engineering

DEWITT CLINTON
Librarian

Standing Committees of the Faculty

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LIBRARY—Professors Hale, Landreth, Bennett, and the Librarian

CATALOGUE—Professors Barnes, Hale, Opdyke

SCHOLARSHIPS—Professors Ripton, Bennett, Ellery

STAGE APPOINTMENTS—Professors McKean, Ellery, March, Ferguson, Lyon

ATHLETICS—Professors Opdyke, Bennett, McComber

ADMISSIONS—Professors Barnes, Ashmore, Ripton, Landreth, Hale, Bennett, Opdyke, March, Garis, Ferguson, Garrison

DISCIPLINE—Professors Ripton, Ashmore, Landreth, Hale, Bennett, Opdyke, March

SCHEDULE—Professors Garis and March, Mr. King

MUSIC—Professors McKean, Ellery, Ferguson

PREPARATORY SCHOOLS—Professors Barnes, Ellery, Garis, Messrs. Cunningham, King

CONVENTIONS—Professors Ashmore, Landreth, March

EMPLOYMENT—Professors Stoller and McKean, Mr. Cunningham

ABSENCES—Professors Ellery, March, Ferguson

SENIOR CLASS—Professors March and Bennett, Mr. Cunningham

JUNIOR CLASS—Professors Stoller and Ashmore, Mr. Taylor

SOPHOMORE CLASS—Professors Ferguson, Lyon, McKean

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President
President's Rooms, South Colonnade

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
College Office
Office Hours 2:30-4 P. M.*

FRANK BAILEY, ART. D.
Treasurer
175 Remsen St., Brooklyn

HARTLEY F. DEWEY
Assistant Treasurer
College Office
Office Hours 8 A. M.-5 P. M.*

FRANK COE BARNES, PH. D.
Secretary
Room 1, Washburn Hall
Office Hours 3-5 P. M.*

JAMES H. STOLLER, PH. D.
Curator of the Museum

DE WITT CLINTON
Librarian
Library Hours 8 A. M.-1 P. M., 2-6 P. M.*, 7:30-9 P. M.

ESTHER G. ELY, Recorder, and Secretary to the Dean
VIOLET K. MOON, Clerk to the Secretary
ANNE O'N. BEATTIE, Secretary to the President
ALMIRA R. WILCOX, Cataloguer in Library

*Except Saturday P. M.

COURSES OF STUDY

1. Courses leading to the degree of A. B.

Classical Course A.—Greek, as indicated on p. —, is required for admission to this course. Latin and Greek are required for two years, and are elective for the remainder of the course. French and German are included, in addition to the ancient languages.

Classical Course B.—This course may be pursued by candidates who satisfy the requirements for admission to the Ph. B. course. Greek is begun on entrance and required for four years. In other respects Course B is virtually identical with Course A.

2. Course leading to the degree of Ph. B.

This course offers Latin without Greek, for which is substituted additional work in modern languages and science.

3. Course leading to the degree of B. S.

This course is based upon the study of mathematics and the sciences, with extended work in English and other modern languages.

In courses 1, 2 and 3 the greater part of the work of the last two years is elective.

4. Courses leading to the degree of B. E.

General Engineering Course.—This course offers the foundation of a broad engineering education, comprising mathematics, the sciences, the fundamental principles of the special branches of the profession, some training in history and economics, a knowledge of both French and German and a course in English. During the third and fourth years two alternative options are offered in this course:

Option A.—In this division the fundamental principles of advanced technical subjects receive emphasis.

Option B.—In this division studies are offered which lead to a training for engineering positions of an executive or administrative nature.

Six-Year Ph. B.-B. E. Course.—This course combines the above four-year engineering course, including both its options, with the Latin scientific course. The subjects of the two courses are interwoven throughout each term and the course thus offers in carefully arranged form a combined college and technical training.

Sanitary Engineering Course.—This differs from course 4 in substituting special work in sanitary engineering for some of the general engineering studies.

Electrical Engineering Course.—This course is intended to give a broad and thorough engineering education, with the specific instruction requisite for electrical engineering.

5. Courses leading to graduate degrees

Course leading to degree of M. C. E.—This course of one year's graduate study, consists of lectures, laboratory practice and research work, and is open to graduates of the general or the sanitary engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of M. E. E.—This course of one year's graduate study consists of lectures, laboratory practice and research work, and is open to graduates of the electrical engineering course of Union College, or of any other institution of a standing recognized by the faculty.

Course leading to degree of Ph. D.—This course of two years' graduate study requires for admission the degree of M. E. E. or an equivalent. For details of the work see page 118.

Students in full standing at the end of Junior year having the profession of medicine in view are permitted to take the first year studies of the Albany Medical College as a substitute for the studies of the first two terms of the senior year in Union College. This enables medical students to lessen the time of their academic and professional studies by one year.

ADMISSION

General Conditions

Blank forms of application for admission to Union College will be sent by the secretary of the faculty on request.

The regular entrance examinations are held on the Thursday and Friday immediately following Commencement, and on the Monday, Tuesday and Wednesday of the first week of the fall term, as indicated in the calendar.

All candidates will be examined in the English requirements, and all candidates for admission to the B. S. course or to any one of the B. E. courses will be examined in plane trigonometry. Candidates for examination in any subject are expected to present a recommendation from their school principal.

Candidates may take the uniform entrance examinations offered by the College Entrance Examination Board. The examinations of the board will be held June 19-24, 1911, and a list of the places at which they are to be held will be published by the board about March 1st. Applications to attend the board's examinations must be addressed to the *Secretary of the College Entrance Examination Board, P. O. Sub-Station* 84, *New York, N. Y.*, and must be made upon a blank form to be obtained from the secretary of the board upon application.

A college entrance diploma issued by the New York State Education Department will be accepted so far as it covers the requirements for admission, except in trigonometry.

Except in English and trigonometry, certificates from schools approved by the faculty will be accepted, if they cover the requirements and contain a recommendation from the principal of the school that the candidate be admitted to college. Blank certificates, to be filled out by principals of schools, will be furnished upon application to the *Secretary of the Faculty, Union College, Schenectady, N. Y.* So far as possible all credentials should be forwarded by July 10 of the year in which the candidate desires to enter, and it is expected that all certificates shall be submitted not later than September 1st. Students who enter the freshman

class by certificate and fail to maintain their class standing cannot enter the next freshman class, except by passing the entrance examinations in the departments in which they have failed.

Candidates must be at least sixteen years old, and, as a preliminary to the entrance examinations, must present satisfactory testimonials of character, and register for the necessary examinations. For the schedule of these examinations see pages 44, 45.

Advanced Standing

Candidates from other colleges must bring letters of honorable dismissal, and upon the presentation of acceptable certificates will be admitted to corresponding standing.

Candidates for a degree must enter not later than the beginning of the senior year.

Requirements for Examinations in 1911

1. A. B. Courses

Course A.—Candidates for admission to the freshman class in Course A. leading to the degree of A. B. must meet the requirements in subjects Nos. 1, 2 (a-c), 3 (a-d; or a-f), 5 (a-b), 7 (a-c), and 8, of the list of subjects specified on pages 34-44. 15 units.

Course B.—Candidates for admission to the freshman class in Course B. leading to the degree of A. B. must meet the requirements in subjects Nos. 1, 3 (a-d; or a-f), 4 (a or b), 5 (a, b), 7 (b-c.), and 8, of the list of subjects specified on pages 34-44. 13½ units.

2. Ph. B. Course

Candidates for admission to the freshman class in the course leading to the degree of Ph. B. must meet the requirements in subjects Nos. 1, 3 (a-d; or a-f), 4 (a or b), 5 (a, b), 7 (b, c), and 8, of the list of subjects specified on pages 34-44. 13½ units.

3. B. S. Course

Candidates for admission to the freshman class in the course leading to the degree of B. S. must meet the requirements in subjects Nos. 1, 4 (a or b), 5 (a-d), 6, 7 (c), 8 and 9 (any three units), of the list of subjects specified on pages 34-44. 14 units.

4, 5. B. E. Courses

Candidates for admission to the freshman class in any one of the four year courses leading to the degree of B. E. must meet the requirements in subjects Nos. 1, 4 (a or b), 5 (a-d), 6, 7 (c), 8 and 9 (any three units), of the list of subjects specified on pages 34-44. 14 units.

Candidates for admission to the freshman class in the six year course leading to the degree of B. E. and Ph. B. must meet the requirements in subjects Nos. 1, 3 (a-d; or a-f), 4 (a or b), 5 (a-d), 6, 7 (b, c), 8 and 9 (any three units), of the list of subjects specified on pages 34-44. 18½ units.

List of Subjects

1. English (3 units)

All candidates for admission to the freshman class will be required to pass a written examination in English, and no candidate will be admitted whose work is seriously defective in spelling, punctuating, grammar, or division into paragraphs.

Questions will be set on topics and extracts drawn from the following books. The first list consists of works to be read carefully, with a view to the absorption of the subject matter, i. e. as books are generally read. The second list consists of books to be read with critical care, in annotated editions, and with reference to dictionary, grammar and rhetoric. The questions on this set will relate to literary form and logical structure, as well as to substance.

For students entering in 1911, the books required for reading and study are as follows:

List (1) *for General Reading*

Nine books are to be selected as follows:—

Group I (two to be selected)

Shakespeare's "As You Like It," "Henry V," "Julius Cæsar," "The Merchant of Venice," "Twelfth Night."

Group II (one to be selected)

Bacon's "Essays;" Bunyan's "The Pilgrim's Progress," Part I; "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography."

Group III (one to be selected)

Chaucers "Prologue;" Spenser's "Faerie Queene" (selections); Pope's "The Rape of the Lock;" Goldsmith's "The Deserted Village;" Palgrave's "Golden Treasury" (First Series) Books II. and III., with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected)

Goldsmith's "The Vicar of Wakefield;" Scott's "Ivanhoe;" Scott's "Quentin Durward;" Hawthorne's "The House of the Seven Gables;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" Dicken's "A Tale of Two Cities;" George Eliot's "Silas Marner;" Blackmore's "Lorna Doone."

Group V (one to be selected)

Irving's "Sketch Book;" Lamb's "Essays of Elia;" De Quincey's "Joan of Arc" and "The English Mail Coach;" Carlyle's "Heroes and Hero Worship;" Emerson's "Essays" (selected); Ruskin's "Sesame and Lilies."

Group VI (two to be selected)

Coleridge's "The Ancient Mariner;" Scott's "The Lady of the Lake;" Byron's "Mazeppa" and "The Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series) Book IV. with especial attention to Wordsworth, Keats and Shelley; Macaulay's "Lays of Ancient Rome;" Poe's "Poems;" Lowell's "The Vision of Sir Launfal;" Arnold's "Sohrab and Rustum;" Longfellow's

"The Courtship of Miles Standish;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine," and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Evleyn Hope," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "The Boy and the Angel," "One Word More," "Hervè Riel," "Pheidippides."

List (2) for Minute and Critical Study

Shakespeare's "Macbeth;" Milton's "Lycidas," "Comus," "L'Allegro," and "Il Penseroso;" Burke's "Speech on Conciliation with America," or Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

Attention is called to the fact that while no examination in grammar or rhetoric, as such, will occur. yet a knowledge of the essential principles of grammar and of the elementary principles of rhetoric is involved in the above requirements. An acquaintance with the general outline of the development of English literature will also be required. Newcomer's "Introduction to English Literature" and Moody and Lovett's "First View of English Literature" are recommended.

For students entering in 1912, the books required for reading and study will be as follows:—

List (1) for General Reading

Nine books are to be selected as follows:—

Group I (two to be selected)

Shakespeare's "As You Like It," "Henry V," "Julius Cæsar," "The Merchant of Venice," "Twelfth Night."

Group II (one to be selected)

Bacon's "Essays;" Bunyan's "The Pilgrim's Progress," Part I; "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography."

Group III (one to be selected)

Chaucer's "Prologue;" Spenser's "Faerie Queene" (Book I);

Pope's "The Rape of the Lock;" Goldsmith's "The Deserted Village;" Palgrave's "Golden Treasury" (First Series) Books II. and III. with especial attention to Dryden, Collins, Gray, Cowper and Burns.

Group IV (two to be selected)

Goldsmith's "The Vicar of Wakefield;" Scott's "Ivanhoe;" Scott's "Quentin Durward;" Hawthorne's "The House of the Seven Gables;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" Dicken's "A Tale of Two Cities;" George Eliot's "Silas Marner;" Blackmore's "Lorna Doone."

Group V (one to be selected)

Irving's "Sketch Book;" Lamb's "Essays of Elia;" De Quincey's "Joan of Arc" and "The English Mail Coach;" Carlyle's "Heroes and Hero Worship;" Emerson's "Essays" (selected); Ruskin's "Sesame and Lilies."

Group VI (two to be selected)

Coleridge's "The Ancient Mariner;" Scott's "The Lady of the Lake;" Byron's "Mazeppa" and "The Prisoner of Chillon;" Palgrave's "Golden Treasury" (First Series) Book IV, with especial attention to Wordsworth, Keats and Shelley; Macaulay's "Lays of Ancient Rome;" Poe's "Poems;" Lowell's "The Vision of Sir Launfal;" Arnold's "Sohrab and Rustum;" Longfellow's "The Courtship of Miles Standish;" Tennyson's "The Princess;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Evleyn Hope," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "The Boy and the Angel," "One Word More," "Hervè Riel," "Pheidippides."

List (2) for Minute and Critical Study

Shakespeare's "Macbeth;" Milton's "Lycidas," "Comus," "L'Allegro," and "Il Penseroso;" Burke's "Speech on Conciliation with America," or Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

For students entering in 1913, the books required for reading and study will be as follows:

List (1) *for General Reading*

Group I

The "Old Testament," comprising at least the chief narratvie episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings, and Daniel, together with the books of Ruth and Esther; the "Odyssey," with the omission, if desired, of Books I, II, III, IV, V, XV, XVI, XVII; the "Iliad," with the omission, if desired, of Books XI, XIII, XIV, XV, XVII, XXI; Virgil's "Aeneid." The Odyssey, Iliad, and Aeneid should be read in English translations of recognized literary excellence.

For any unit of this group a unit from any other group may be submitted.

Group II

Shakespeare's "Merchant of Venice," "Midsummer Night's Dream," "As You Like It," "Twelfth Night," "Henry the Fifth," "Julius Cæsar."

Group III

Defoe's "Robinson Crusoe, Part I;" Goldsmith's "Vicar of Wakefield;" either Scott's "Ivanhoe," or Scott's "Quentin Durward;" Hawthorne's "House of the Seven Gables;" either Dicken's "David Copperfield," or Dicken's "Tale of Two Cities;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" George Eliot's "Silas Marner;" Stevenson's "Treasure Island."

Group IV

Bunyon's "Pilgrim's Progress, Part I;" "The Sir Roger de Coverley Papers" in the Spectator; Franklin's "Autobiography" (condensed); Irving's "Sketch Book;" Macaulay's "Essays on Lord Clive" and "Warren Hastings;" Thackeray's "English Humourists;" "Selections" from Lincoln, including at least the two Inaugurals, the Speeches in Independence Hall and at Gettysburg, the Last Public Address, and Letter to Horace Greeley, along with a brief memoir or estimate; Parkman's "Oregon

Trail;" either Thoreau's "Walden," or Huxley's "Autobiography" and selections from "Lay Sermons," including the addresses on Improving Natural Knowledge, A Liberal Education, and A Piece of Chalk; Stevenson's "Inland Voyage" and "Travels with a Donkey."

Group V

Palgrave's "Golden Treasury (First Series), Books II and III," with especial attention to Dryden, Collins, Gray, Cowper, and Burns; Gray's "Elegy in a Country Churchyard" and Goldsmith's "Deserted Village;" Coleridge's "Ancient Mariner" and Lowell's "Vision of Sir Launfal;" Scott's "Lady of the Lake;" Byron's "Childe Harold, Canto IV," and "Prisoner of Chillon;" Palgrave's "Golden Treasury (First Series), Book IV," with especial attention to Wordsworth, Keats, and Shelley; Poe's "Raven," Longfellow's "Courtship of Miles Standish," and Whittier's "Snow Bound;" Macauley's "Lays of Ancient Rome" and Arnold's "Sohrab and Rustum;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine," and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "Hervè Riel," "Pheidippides," "My Last Duchess," "Up at a Villa-Down in the City."

List (2) *for Minute and Critical Study*

Shakespeare's "Macbeth;" Milton's "L'Allegro," "Il Penseroso," and "Comus;" either Burkes' "Speech on Conciliation with America," or both Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" either Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

2. Greek (3 units)

a. Grammar and Composition. The common forms, idioms, and constructions, and the general grammatical principles of

Attic Greek prose. Translation into Greek of detached sentences and very easy continuous prose based upon the Anabasis.

b. Xenophon. The first four books of the Anabasis.

c. Homer. The first three books of the Iliad (omitting II, 494-end) and the Homeric constructions, forms and prosody.

In connection with the reading in Greek there should be constant practice in sight translation and in prose composition.

The attention of instructors is particularly directed to the student's need of a full and accurate knowledge of the Greek and the Latin Grammar.

See also 7a.

3. Latin (4 units)

a. The usual first year's (elementary) Latin of the high school course, including Latin (prose) writing.

In addition, the following authors (or parts of authors) are required:

b. Four books of Cæsar's Gallic War.

c. Six books of Vergil's Aeneid.

d. Six orations of Cicero.

Equivalents will be accepted at the discretion of the head of the department.

These requirements presuppose a four-years' course, either at the public high school or at a private school of similar standing. A student who has been elsewhere prepared will be expected to be proficient also in

e. Two thousand lines of Ovid, and in

f. Sallust's "Catiline" or "Jugurtha."

Every student is required to use in the college class room the "Roman Method" of pronunciation, and is expected to have had practice in this method at school.

The grammars of Allen and Greenough (New), Harkness (Complete), Gildersleeve-Lodge, Bennett, Lane and Morgan, and West are recommended.

See also 7b.

4. Modern Languages (2 units)

a. German. Two years' work will be necessary to meet this requirement.

During the first year the work should comprise: (1) careful drill upon pronunciation; (2) the memorizing and frequent repretition of colloquial sentences; (3) drill upon the rudiments of grammar, that is, upon the inflection of the articles, of such nouns as belong to the language of every-day life, of adjectives, pronouns, weak verbs, and the more usual strong verbs; also upon the use of the more common prepositions, the simpler uses of the modal auxiliaries, and the elementary rules of syntax and word-order; (4) abundant easy exercises designed not only to fix in mind the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (5) the reading of from 75 to 150 pages of graduated texts from a reader, with constant practice in translating into German easy variations upon sentences selected from the reading lesson (the teacher giving the English), and in reproducing from memory sentences previously read.

During the second year the work should comprise: (1) the reading of from 150 to 250 pages of literature in the form of stories and plays; (2) accompanying practice, as before, in the translation into German of easy variations upon the matter read and also in the off-hand reproduction, sometimes orally and sometimes in writing, of the substance of short and easy selected passages; (3) continued drill upon the rudiments of the grammar, with constant application in the constructions of sentences.

b. French. Two years' work will be necessary to meet this requirement.

During the first year the course should include: (1) careful drill in pronunciation; (2) the rudiments of grammar, including the inflection of the regular and the more common irregular verbs, the plural nouns, the inflection of adjectives, participles, and pronouns; the use of personal pronouns, common adverbs, prepositions, and conjunctions; the order of words in the sentence and the elementary rules of syntax; (3) abundant easy exercises, designed not only to fix in the memory the forms and principles of grammar, but also to cultivate readiness in the reproduction of natural forms of expression; (4) the reading of from 100 to 175 duodecimo pages of graduated texts, with con-

stant practice of translating into French easy variations of the sentences read (the teacher giving the English), and in reproducing from memory sentences previously read; (5) writing French from dictation.

During the second year the work should comprise: (1) the reading of from 250 to 400 pages of easy modern prose in the form of stories, plays, or historical or biographical sketches; (2) constant practice, as in the previous year, in translating into French easy variations upon the texts read; (3) frequent abstracts, sometimes oral and sometimes written, or portions of the text already read; (4) writing French from dictation; (5) continued drill upon the rudiments of grammar, with constant application in the construction of sentences; (6) mastery of the forms and use of pronouns, pronominal adjectives, of all but the rare irregular verb forms, and of the simpler uses of the conditional and subjunctive.

5. Mathematics (2½ units; 3½ units)

a. Algebra. The four fundamental operations for rational algebric expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions, ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations radicals, including the extraction of the square root of polynomials and of numbers; exponents, including the fractional and negative.

Simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations.

Problems depending upon quadratic equations.

The binomial theorem for positive integral exponents.

The formulas for the nth term and the sum of the terms of arithmetic and geometric progressions, with applications.

b. Plane Geometry. The usual theorems and constructions of good text-books, including the general properties of plane rectilinear figures; the circle and the measurement of angles;

similar polygons; areas; regular polygons and the measurement of the circle.

The solution of numerous original exercises, including loci problems.

Application to the mensuration of line and plane surfaces.

c. Solid Geometry. The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders, and cones; the sphere and the spherical triangle.

The solution of numerous original exercises, including loci problems.

Applications to the mensuration of surface and solids.

d. Trigonometry. Definitions and relations of the six trigonometric functions as ratios; circular measurement of angles.

Proofs of principal formulas, in particular for the sine, cosine, and tangent of the sum and the difference of two angles, of the double angle and the half angle, the product expressions for the sum or the difference of two sines or of two cosines, etc.; the transformation of trigonometric expressions by means of these formulas.

Solution of trigonometric equations of a simple character.

Theory and use of logarithms (without the introduction of work involving infinite series).

The solution of right and oblique triangles, and practical applications, including the solution of right spherical triangles.

6. Physics (1 unit)

An elementary knowledge of physics, such as may be gained by a year's course of study covering mechanics, sound, heat, light and electricity, as treated in any standard high school text book. Preparation should include individual laboratory work, attested by a note-book, comprising at least thirty-five exercises, chiefly quantitative.

7. History (1 unit; 2 units)

a. Greek History. In this study must be included the geography of ancient Greece.

b. Roman History (Botsford's). In this study must be included the geography of the Roman Empire.

c. History of the United States.

Elementary United States history will be accepted if the candidate presents in addition a year of history not otherwise required.

8. **Physiology** (½ unit)

9. **Electives** (3 units)

Spansih 1 (1); Spanish 2 (1); German 3 (1); French 3 (1); Chemistry (1); Biology (1); Zoology (1); Botany (1); Physics (1); Spherical trigonometry (½); History of English literature (½); Greek (3); Latin (4).

The figure in parenthesis after each subject shows the unit value of that subject.

Entrance Examinations

1911

Entrance examinations will be held at the college in June and in September, in accordance with the schedule given below. A fee of five dollars is required at the time of registration.

Only those who register at the appointed time will be admitted to the examinations of the following days.

Schedule of the June Examinations

Thursday, June 15

9 A. M. Candidates register at the office of the secretary.

11 A. M. to 1 P. M.....Mathematics a. (Algebra complete)
Physiology

2 P. M. to 4 P. M.....History a. b. (American and ancient)
Physics

3 P. M. to 5 P. M.....English (Parts 1 and 11)

Friday, June 16

9 A.M. to 11 A M.....Latin (as required)
Mathematics c. (Solid Geometry)
11 A.M. to 1 P. M.....German (elementary and advanced)
French (elementary and advanced)
2 P. M. to 4 P. M.....Greek (as required)
Mathematics b. (Plane Geometry)
Mathematics d. (Plane Trigonometry)

Schedule of the September Examinations

Monday, September 18

9 A. M. Candidates register at the office of the secretary.

Tuesday, September 19.

9 A.M. to 11 A.M.....Physics
Physiology
11 A.M. to 1 P. M.....Mathematics a. (Algebra (complete)
2 P. M. to 4 P. M.....History a. b. (American and ancient)
3 P. M. to 5 P. M.....English (Parts 1 and 11)

Wednesday, September 20.

9 A.M. to 11 A.M.....Latin (as required)
Mathematics c. (Solid Geometry)
11 A.M. to 1 P. M.....German (elementary and advanced)
French (elementary and advanced)
2 P. M. to 4 P. M.....Greek (as required)
Mathematics b. (Plane Geometry)
Mathematics d. (Plane Trigonometry)

DEPARTMENTS OF INSTRUCTION

The Greek Language and Literature

PROFESSOR BENNETT

In course A, leading to the degree of Bachelor of Arts, Greek is required during the freshman and sophomore years, and may be elected during the junior and senior years; in course B, leading to the degree of Bachelor of Arts, Greek is begun on entrance and required for four years.

1. **Greek Grammar; Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phædo; **Aristophanes:** The Clouds.

Required of freshmen in course A. Four hours weekly throughout the year.

2. **The Elements of Greek**

Required of freshmen in course B. Four hours weekly throughout the year.

3. **Aeschylus:** Prometheus Vinctus; **Sophocles:** Oedipus Tyrannus; **Euripides:** Medea; **Herodotus; Homer.**

Required of sophomores in course A. Three hours weekly throughout the year.

4. **Xenophon:** The Anabasis

Required of sophomores in course B. Three hours weekly throughout the year.

5. **Homer; Thucydides**

Elective for juniors in course A. Two hours weekly throughout the year.

6. **Xenophon:** The Memorabilia; **Plato:** The Apology, the Crito and parts of the Phædo.

Required of juniors in course B. Two hours weekly throughout the year.

7. **Aeschines:** Against Ctesiphon; **Demosthenes:** De Corona; **Theocritus.**

Elective for seniors in course A. Two hours weekly throughout the year.

8. Homer

Required of seniors in course B. Two hours weekly throughout the year.

The above courses are typical only. The books read are varied from year to year.

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9. Honors: Candidates for honors in Greek, either in A. B. course A, or in A. B. course B, will be required to take all the work in Greek offered in their respective courses, to maintain a general average of ninety per cent. in that work, to meet for two additional hours a week during the first two terms of the senior year for the study of a Greek text, and to write theses on assigned subjects.

The Latin Language and Literature

PROFESSOR ASHMORE

The studies of this department are required, in the freshman and sophomore years, of all students who are candidates for either one of the two degrees, A. B. and Ph. B. In the junior and senior years Latin becomes an elective study, except for students who are candidates for honors in Latin; of them it is required.

1. Livy: Book XXI and selections from Book XXII; Roman history.—**Tacitus:** Agricola and Germania.—**Cicero:** De Senecture or De Amicita or De Officiis (Book I). Latin composition.

Required of freshmen in the A. B. and Ph. B. courses. Four hours weekly throughout the year.

2. Terence: One or more of the plays.—**Plautus:** Captivi or an equivalent. Lectures on ancient comedy.—**Horace:** Selected Odes and Episodes.

Required of sophomores in the A. B. and Ph. B. courses. Three hours weekly throughout the year.

3. **Juvenal** and **Horace** (Satires). History of Roman literature. Lectures on archaeological topics.—**Pliny the Younger** or **Cicero** (Letters). Private life of the Romans.

Elective for juniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

4. **Lucretius:** Selections. Lectures on the atomic theory and the philosophy of Epicurus.—The literature of the Empire; **Suetonius** or **Seneca** or **Quintilian** or **Martial.**—Early Latin or some subject especially suited to students intending to become teachers.

Elective for seniors in the A. B. and Ph. B. courses. Two hours weekly throughout the year.

In general, subsidiary reading will be recommended all along the line. Equivalents may be substituted in the elective programme at any time, and the order of the subjects as given above may be altered in any one of the four years, at the discretion of the head of the department.

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5. **Honors:** Candidates for special honors in Latin are required to take the Latin of the four years; to do additional reading in private, to be indicated by the department; and to prepare a thesis on some subject directly related to the work of the class room.

Modern Languages

PROFESSOR BARNES, ADJUNCT PROFESSOR MARCH
DR. STEWART AND INSTRUCTOR PARKER

A reliable practical knowledge of the language studied is the first result aimed at in all the classes, but as soon as possible the literary side of the language is brought to the front, and good books are read for what they contain. The more advanced courses vary somewhat from year to year, according to the judgment and preference of the instructors, and the ability and character of the students composing the classes.

German

1. Elementary. Grammar study: with exercises and supplementary composition; reading and memorizing; use of German in class. German reader and selections on popular scientific subjects.

Required in all courses of freshmen who offer French at entrance and in the B. S. course of those who offer Latin. Three hours weekly throughout the year.

1a. Elementary. Grammar, reader and exercises. Schiller: Wilhelm Tell; Goethe: Hermann and Dorothea.

Required of sophomores in the A. B. course and of freshmen as in 1 who have had one year of German in school. Three hours weekly throughout the year.

2. Intermediate. Grammar for review and reference; connected composition; use of German in class. The time in class is devoted to the reading and discussion of selected works from the German classics and from recent drama and fiction; matter is also assigned for outside reading with reports and examination on the work done. The work varies somewhat from year to year, but aims to give every class an acquaintance with some of the masterpieces of German literature and some knowledge of present day German life and institutions.

Required in the Ph. B., B. S. and B. E. courses of freshmen who offer German at entrance; in the A. B. (B.), Ph. B. and B. S. courses of sophomores who have had German 1; and in the A. B. course of sophomores who have had two years of German before entrance. Elective in the A. B. course of juniors who have had 1a. Three hours weekly throughout the year in the Ph. B. and B. S. (or A. B.) courses and during terms 1 and 2 in the B. E. course.

2a. Intermediate. This is a course in the reading of scientific German. A reader consisting of selections on scientific subjects forms the basis of the work and is supplemented by one or more monographs on technical subjects within the grasp of the class at this stage of its work.

Required, during the third term, of B. E. members of German 2. Three hours weekly through the term.

3. **Advanced.** Nineteenth century drama, development and leading representatives. Readings from Von Kleist and Grillparzer. Das junge Deutschland; assigned study. Readings from Hebbel, Ludwig and Von Wildenbruch. Die freie Bühne; assigned study. Nineteenth century fiction. Readings from Sudermann, Hauptmann, Meyer, Scheffel and others.

Elective for juniors in the Ph. B. and B. S. courses who have done 2 and for juniors in the A. B. course who have done 1a with a grade of 90. Required, as an alternate with French, of sophomores in the Ph. B. and B. S. courses who in freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

3a. **Advanced.** Goethe and the classical period, readings and assigned studies. Lessing: Nathan der Weise, Emilia Galotti; Schiller: Wallenstein, Maria Stuart, Jungfrau von Orleans. Outline study of the lives of these writers. Koch: Geschichte der deutschen Literatur as a handbook, with references to other works.

This course alternates with course 3 and is given under the same conditions.

3b. **Special.** This course is given in three sections: (a) A course in composition and conversation, based on Stern's Geschichten von deutschen Städten or a similar work; (b) A course in commercial German, consisting of reading, correspondence and newspaper work; (c) A course in the reading of historcial and political matter, with composition based on the articles read.

This course may be substituted for course 3a, and is given under the same conditions.

4. **Advanced.** Goethe: (1) A study of Goethe's life and works with readings from his autobiography and epic writings: Eg-

mont, Iphigenie auf Tauris, Torquato Tasso. (2) Faust: Part 1. reading and interpretation; the Faust legend in literature.

Elective for seniors in the A. B., Ph. B. and B. S. courses who have had necessary previous training. This course will ordinarily follow course 3. Two hours weekly throughout the year.

4a. Advanced. (a) History of German literature: Reading and discussion in class with references to various works, accompanied by Musterbuch and special assignments. (b) A course in Middle High German: Grammar and reading, supplemented by an outline study of the history of the language. Two hours weekly throughout the year.

This course alternates with course 4 and is given under the same conditions. It is expected that those electing it will have had course 3a, It is intended primarily for students who are preparing to teach German.

4. Special. This course consists in the reading of one or more historical monographs and, when time allows, a historical novel, with parallel readings; followed by a careful study of a number of political speeches and parliamentary addresses, with discussion of the topics involved; supplemented by the reading of newspaper reports and editorial articles. The work aims to lay the foundation for future study along these lines and to give some insight into present governmental and social conditions in Germany.

This course may be substituted for course 4a, and is given under the same conditions

5. Honors. Special courses, open only to members in good standing in senior elective German, are offered to candidates for honors in this department.

French

1. Elementary. Grammar and the reading of simple French texts. Constant drill in grammatical forms, common idioms, pronunciation and writing to dictation.

Required of freshmen in the A. B. course (A); of freshmen

in the A. B. (B), Ph. B., B. S., and B. E. courses who offer German at entrance. Three hours weekly throughout the year.

1a. **Elementary.** Grammar reviewed; composition; selected readings of second year or higher grade.

Required, in place of French 1, of those who have had one year of French before entrance.

2. **Intermediate.** Grammar reviewed; composition, writing to dictation, and memorizing. In addition to daily translation in class, easy reading is assigned to be done outside and reported upon. Since this course is for most students the last required French in college, it is devoted to selected works of various periods. The number and character of the books read may vary considerably from class to class.

Required of freshmen in the Ph. B. and B. S. courses who offer French at entrance; in the A. B. course of those who have had two years of French before entrance. Three hours weekly throughout the year.

2a. **Intermediate.** This course is similar to course 1a.

Required of sophomores in the A. B. (B), Ph. B. and B. S. courses who have had French 1. Three hours weekly throughout the year.

3. **Advanced.** French literature of the 19th century. Discussion of various authors and of some phases of modern French life and character; assigned reading; careful translation in class. With suitable classes, attention is paid to French etymologies, and the laws of the evolution of the language.

Elective for juniors of the A. B., Ph. B. and B. S. courses. Required, as an alternate with German, of sophomores in the Ph. B. and B. S. courses who in freshman year were admitted to both German 2 and French 2. Three hours weekly throughout the year.

4. **Advanced.** French literature of the 17th century. Selected works of Corneille, Racine, Molière, and La Fontaine,

are read carefully in class. Assigned readings, discussions of men, of their work and of the period.

Elective for seniors of the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

This course may in any year be a continuation of course 3.

5. **Honors.** Advanced courses, leading to special honors in French, are offered to those students who are qualified to pursue them.

Spanish

1. **Junior Elective.** Grammar, exercises and reader; practice and sight translation. Selections from Gil Blas, a recent novel and a modern play are read.

Open to juniors in the A. B., Ph. B. and B. S. courses and to seniors who have not had Spanish in junior year. Three hours weekly throughout the year.

2. **Senior Elective.** Grammar and composition. In connection with a brief survey of the development of Spanish literature, one or two dramas of the classical period and one or two modern plays are read, together with some works of recent fiction. The amount read depends upon the nature of the works selected and the ability of the students composing the class.

Open to seniors who have had Spanish 1. Two hours weekly throughout the year.

English Language and Literature

PROFESSOR HALE

1. **Old English.** This course gives an introduction to the language in Cook's First Book in Old English, with especial attention to the phonology and the relations of Old and Modern English with the other Teutonic languages. In the third term the work is carried on either by a study of Old English poetry in "Beowulf" or by further reading in West Saxon prose, especially the Chronicle.

Elective for juniors in all courses. Two hours weekly throughout the year.

For this course may be substituted on request a course on the History of the English Language.

2. **History of English Literature.** This study is pursued with a text-book for the purpose of giving a foundation knowledge of the facts of English Literature.

Required of sophomores in the A. B., Ph. B. and B. S. courses. Two hours weekly during the fall and winter terms.

3. **Shakespeare.** A careful reading of "Hamlet," with particular attention to the language, action and characters, and a summary of questions of text, date, and sources. A view is also given of the conditions of the Elizabethan theatre, and the general standpoint taken is that of the acted drama.

Required of sophomores in the B. E. course during the fall term, and of sophomores in the A. B., Ph. B. and B. S. courses during the spring term. Two hours weekly.

4. **Shakespeare.** A study of plays chosen to represent the different periods of Shakespeare's life and the different forms of the Shakespearean drama. Six plays will be read each year, different plays being chosen each year from those of the year before. In 1909-1910 the chief comedies were read.

Elective for seniors and juniors in all courses. One hour weekly throughout the year.

5. **Modern Literature.** The study of some characteristic works of the nineteenth century: in 1908-1909 the essays of Macaulay and Carlyle on Boswell's Johnson were the subject; in 1909-1910, Tennyson's "Idylls of the King."

Required of sophomores in the B. E. course. Two hours weekly during the winter and spring terms.

6. **English Prose.** The course considers especially the novel, the short story and the essay. In each case especial attention is given to the general character of the literary form in question and the specific character of the different authors that can be treated. In the study of the novels, Perry's "Study of Prose

Fiction" has been used; otherwise the work is carried on without a text-book.

Required of juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

7. English Poetry of the Nineteenth Century. An introduction to the critical study of poetry. Page's "British Poets of the Nineteenth Century" furnishes a collection of texts in which the work may readily be followed. The main plan is to form habits of discrimination, and a poetic taste by distinguishing between the characteristics of the different poets read.

Elective for seniors in all courses. Two hours weekly throughout the year.

8. Honors. An advanced course leading to special honors is offered to those students who are qualified to pursue them. In 1909-1910 the topic was "Elizabethan Literature."

Rhetoric and Public Speaking

PROFESSOR MCKEAN

1. Freshman Rhetoric. The work is pursued by means of recitations, written exercises, criticisms, discussions and informal lectures.

Required of freshmen in the A. B., Ph. B. and B. S. courses Two hours weekly throughout the year.

1a. Freshman Rhetoric. The work is pursued as in course 1. The instruction, however, is somewhat more technical and scientific in general character than that of course 1.

Required of freshmen in the B. E. course. Two hours weekly throughout the year.

2. Sophomore Rhetoric. The work consists in the writing of orations with criticism and a delivery of them, either in special appointments or before the class, and the writing and criticism of essays.

Required of sophomores in the A. B., Ph. B. and B. S. courses

during the second and third terms, and in the B. E. course throughout the year. One hour weekly.

3. **Junior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all juniors. One hour weekly throughout the year.

4. **Argumentation and Debate.** The work follows a text-book on the art of debate during the fore part of the year. Following this, considerable practice is given in the preparation of briefs and arguments and in oral debates.

Elective for juniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

5. **Advanced Argumentation and Debate.** The work is like that of course 4, but of a more advanced character.

Elective for seniors in the A B., Ph. B. and B. S. courses who have completed course 4.

6. **Senior Rhetoric.** The work is like that of course 2, but of a more advanced character.

Required of all seniors in the A. B., Ph. B. and B. S. courses. One hour weekly throughout the year.

6a. **Senior Rhetoric.** One literary essay each term.

Required of seniors in the B. E. course during the fall and winter terms.

History and Government

PROFESSOR RIPTON

The work of the department covers three years, beginning with the first term of the sophomore year. The instruction is given by text-book, by lectures, and by library references.

1. **Medieval and Modern History.** The course begins with a brief study of the Roman Empire and the contribution of the ancient world to modern civilization. Attention is given to events which have had permanent influence upon the historical development of Europe, and to institutions of enduring import-

ance; among these may be named the medieval church, the feudal institutions, the French monarchy, and the English constitution. The course is designed to form a foundation of historical knowledge which may serve as a preparation for any further study, and to give to the student some acquaintance with methods of historical study and the use of authorities and sources.

Required of sophomores in the A. B., Ph. B. and B. S. courses, and of juniors in B. E. course, Option B. Two hours weekly throughout the year.

2. **American History.** A study is made of the period of American discovery and exploration and of the colonial period. The main part of the work, however, begins with an examination of the causes of the American Revolution. The course is guided by text-books and lectures, and much work is done in the library among the sources and authorities.

Elective for juniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year. Required of juniors in the B. E. courses. Two hours weekly throughout the year.

3. **French Revolution and Nineteenth Century.** This course considers the causes, ideas and progress of the French Revolution and the reconstruction of European politics and society produced by the revolutionary and Napoleonic wars. It then takes up an examination of the events and forces which contributed to the unification of Italy and of Germany, and concludes with a brief study of the Eastern Question. The course is designed to give a clear understanding of political affairs as they exist in Europe to-day and the historical processes by which they were brought about.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

4. **Comparative Politics.** A comparative study is made of the constitutions and governments of England, the United States, and the principal nations of continental Europe. Sufficient attention is given to historical origins to account for characteristic differences, but the work consists mainly of a systematic study of the constitutions, their adoption and methods of amendment, the

distribution of governmental powers, and their practical operation, including some account of political parties.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Required of seniors in the B. E. course, Option B. Three hours weekly throughout the year.

5. **Honors.** Candidates for special honors in history are assigned subjects for study which are designated to give training in historical method and the use of sources.

Philosophy

PROFESSOR HOFFMAN

The courses in this department begin with the first term of the junior year and extend through the entire senior year. Logic, elementary psychology and elementary ethics come in the junior year and are required. All the other courses are taken up in the senior year and are elective. Instruction in the various studies of the department is usually given by means of lectures, discussions, and the use of a text-book.

1. **Logic.** This study, inasmuch as it is required, is confined to the simple elements of the science. As soon as the rules of correct thinking are mastered, the student is put at once to the analysis of arguments, the chief purpose of the study being to develop skill in detecting fallacies. Extracts from many authors are brought before the class for criticism, and so far as possible they are taken from every field of thought.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

2. **Elementary Psychology.** This course is designed to acquaint the student with the most obvious facts of his mental experience; and the attempt is made to classify these facts into a system. The relation of psychology to the other sciences is set forth, and the importance of the study is emphasized in that it lays the foundation for all the sciences of man as a political, moral and religious being.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during the second term.

3. **Elementary Ethics.** Only the outlines of the subject are presented in this course. The ordinary duties of man are pointed out by first describing those concerning himself and those that arise from his relation to others, to nature, and to God.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

4. **Advanced Psychology.** The chief problems discussed in this course are the recent views concerning the nature of perception, the localization of functions and the theories concerning memory, conception, the emotions and the will. The facts of abnormal psychology, are also here considered, especially insanity, dreams, hypnotism, telepathy, and the hypothesis of a secondary self.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during first term.

5. **Advanced Ethics.** Some account of the history of ethics is given in this course, and present ethical theories are stated and discussed. The relation of ethics to other sciences is emphasized and much attention is given to the ethical problems involved in such questions as education, taxation, transportation, corporations, the treatment of criminals, the care of the poor, and the formation and dissolution of the family.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during second term.

6. **Evolution of Religion.** The object of this course is to show how religion originates and to trace out the steps taken in its development. The chief ideas of the leading religions of the heathen world are critically examined, their excellencies and defects are pointed out, and a comparison of them is made with the special doctrines of the Christian system.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

7. **History of Philosophy.** The attempt is made in this course to go over with considerable detail the general field of philosophy from the earliest times down to the present day. In this way the

views of the principal thinkers of the world are presented and discussed upon a great variety of problems, such as the validity of knowledge, the nature of virtue, the foundations of the state and the existence of God. Much is made in this course of the historical connection of the different systems for the purpose of impressing upon the mind of the student the successive steps that have been taken in the actual development of thought.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

8. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Economics and Sociology

PROFESSOR KENNEDY

1. **Economic History.** The economic history of England from the tenth century to the present time, and the leading events in the economic history of the United States are considered.

Required of seniors in the A. B., Ph. B., B. S. courses, and in the B. E. course, Option B. Three hours weekly during the first term.

2. **Elements of Economics.** General economic theory is studied; special attention is given to the theory of distribution and its relation to economic problems.

Required of seniors in the A. B., Ph. B. and B. S. courses, and in the B. E. course, Option B.

3. **Elements of Economics.** Designed to give a brief study of the general principles of economics and an application of these to practical economic problems.

Required of seniors in the B. E. course: G. E., Option A, and E. E.

4. **The Principles of Sociology.** A study of the origin, growth, structure, and activities of society, with a view of acquiring a systematic description and explanation of social phenomena as a whole.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the first term.

5. Charities and Corrections. Cause of degeneracy, treatment of dependents and delinquents. Particular attention is given to causes of poverty and crime, the method of treatment, and the responsibility of the community.

Elective for seniors in A. B., Ph. B. and B. S. courses. Three hours weekly during the second and third terms. Follows course 4.

Mathematics

PROFESSOR GARIS

Mathematics is required in the A. B., Ph. B. and B. S. courses during the freshman year and is elective during the sophomore, junior and senior years. The object of the instruction in these courses is to train the student to clear and exact thinking and to provide him with a knowledge of mathematics broad enough to enable him to give instruction in preparatory schools or to pursue his studies further to good advantage.

The following courses are given:

1. Solid Geometry

Required of freshmen in the A. B. and Ph. B. courses. Four hours weekly during the first term.

2. Higher Algebra.

Required of freshmen in the B. S. course during the first term, and of freshmen in the A. B. and Ph. B. courses during the second term. Four hours weekly.

3. Trigonometry

Required of freshmen in the A. B. and Ph. B. courses. Three hours weekly during the third term.

4. Plane Analytic Geometry

Required of freshmen in the B. S. course. Three hours weekly during the second and third terms.

5. Theory of Equations

Elective for sophomores in the A. B. and Ph. B. courses. Two hours weekly during the first term.

6. Plane Analytic Geometry

Elective for sophomores in the A. B. and Ph. B. courses. Two hours weekly during the second and third terms.

7. Solid Analytic Geometry

Elective for sophomores in the B. S. course and for juniors in the A. B. and Ph. B. courses who have had 6. Two hours weekly during the first term.

8. Differential Calculus

Elective for sophomores in the B. S. course and for juniors in the A. B. and Ph. B. courses who have had 7. Two hours weekly during the second and third terms.

9. Integral Calculus

Elective for juniors in the B. S. course and for seniors in the A. B. and Ph. B. courses who have had 8. Two hours weekly throughout the year.

10. Differential Equations

Elective for seniors in the B. S. course who have had 9. Two hours weekly during the first and second terms.

11. Theory of Functions

Elective for seniors in the B. S. course who have had 10. Two hours weekly during the third term.

12. Honors. Candidates will be given advanced work in various subjects suited to their special ability.

Open to seniors in the A. B., Ph. B. and B. S. courses. Two hours weekly throughout the year.

Mechanics and Physics

PROFESSOR OPDYKE

The required work in physics extends through the three terms of the sophomore year. This is followed by electives

Union College

Ichabod Spencer Lectureship on Psychology

By the gift to the college of $75,000 by Mrs. Katherine Spencer Leavitt, the chair of philosophy has been endowed and will be known hereafter as the Ichabod Spencer Professorship in Philosophy.

Of the total amount Mrs. Leavitt has set aside the sum of $25,000 to establish a lectureship in psychology in memory of her father, the Reverend Ichabod Spencer, D. D., of the class of 1823, to be known as the Ichabod Spencer Lectureship in Psychology.

The first series of lectures upon this foundation will be given during this year by James R. Angell, A. M., professor and head of the department of psychology in the University of Chicago. The general subject of the lectures will be Modern Psychology. The first lecture will be given January 23, 1911, and will be followed at fortnightly intervals by the other lectures of the course.

in laboratory work and in mathematical physics. The collection of apparatus for the illustration of lectures is extensive, and has been secured largely from foreign makers, including sets of standard pattern by Koenig, Duboscq, Ruhmkorff and others.

The courses in greater detail are these:

1. **General Physics.** This course is intended to give a general presentation of the facts and laws of physics. No knowledge of mathematics is assumed beyond an acquaintance with algebra and plane trigonometry. Experimental lectures, recitations and discussions aim to make the student familiar with the chief phenomena of physics and their explanation.

Required of sophomores in the A. B., Ph. B. and B. S. courses. Three hours weekly throughout the year.

1a. **Elective in Laboratory Work.** This course is open to those who have taken 1, and consists of individual work by the students themselves in the laboratory. The experiments performed are such as allow accurate measurement of the quantities involved; and the results obtained are used to verify some general law, or to obtain some physical constant of nature.

Elective for juniors and seniors in the A. B., Ph. B. and B. S. courses. Two periods of two hours each weekly throughout the year.

2. **General Physics for Engineers.** This course treats the subject more mathematically than 1, and is given to students in the engineering course. The calculus is used, more especially during the second and third terms. Assuming some knowledge of the fundamental facts of physics, attention is paid to the discussion of the phenomena and their mathematical analysis, in so far as this is possible with the use of the more elementary analytical methods. The work consists of lectures, recitations and laboratory practice.

Required of sophomores in the B. E. course. Two, three and three classroom hours a week throughout the first, second and third terms, respectively; and one laboratory period a week throughout the year.

2a. **Elective in Mathematical Physics.** This course is open to those who have taken 2, and aims to carry out and complete the mathematical discussion of some parts of the subject. A good knowledge of calculus is required, and an elementary knowledge of differential equations. Some time is devoted to a further study of differential equations as applied to physical problems, and through lectures and assignments of reading the student is introduced to more advanced work.

Elective for juniors and seniors who have taken 2. Two hours a week throughout the year.

3. **Astronomy.** A short course in astronomy is also given. This course is general and descriptive in character, including some reference to the more elementary mechanical aspects of the subject.

Required of juniors in the A. B. and B. S. courses, and open as an elective to the juniors in the Ph. B. course. Three hours a week throughout the second term.

4. **Spherical Trigonometry and Astronomy.** This course differs from the preceding in that it begins with the study of spherical trigonometry as applied to some of the problems of practical astronomy. The course is less descriptive and more mathematical than 3.

Required of juniors in the general engineering course, Option A, and in the sanitary engineering course. Three hours a week throughout the third term.

5. **Honors.** Candidates for special honors must have taken the elective in mathematical physics (2a) and are required to complete a special course of assigned work and reading, extending throughout the senior year, and to submit theses.

Chemistry

PROFESSOR ELLERY AND INSTRUCTOR EASTMAN

The object of the instruction in this department is to develop power of accurate observation, of logical reasoning, and

of forming correct judgments on observed facts. Students who are planning special courses in chemistry, medicine, biology, geology, or other branches of natural science, will find the courses of great value.

1. **General Chemistry.** The course includes an exhaustive study of the non-metals and their compounds, together with the fundamental laws and theories of chemistry, a special study of the common metals, and an introduction to organic chemistry. The work is distributed through the year as follows:

Fall term: Theories and general principles; study of the occurrence, preparation and properties of the non-metals.

Two recitations and one laboratory period each week.

Winter term: Study of the occurrence, metallurgy and properties of the common metals, and reactions for the metals in solution.

Three recitations and one laboratory period each week.

Spring term: Study of reactions of acid radicals in solution. Elementary blowpipe analysis.

Three recitations and one laboratory period each week.

Required of sophomores in the B. E. course.

1a. **General Chemistry.** This course is similar to course 1, in that it includes the study of metals and non-metals, theories and principles, but no analytical work is done.

Required of freshmen in the B. S. course, and of sophomores in the Ph. B. course. Elective for juniors and seniors in the A. B. course. Two recitations and one laboratory period a week throughout the year.

2. **Qualitative Analysis.** This course comprises a systematic examination of metals and acid radicals in solution, and a systematic examination of complex solids.

Required of juniors in the B. E. course. Four laboratory periods a week during the fall term.

2a. **Qualitative Analysis.** A study of the reactions of bases and acids in solution, a complete course in blowpipe analysis, a

systematic examination of solutions of metals and acids, and of complex solids. The aim of the year's work is to enable the student to make a complete qualitative analysis of complex inorganic substances.

Required of sophomores in the B. S. course, elective for juniors and seniors in the Ph. B. course, and for seniors in the A. B. course who have had course 1a. Three laboratory periods a week throughout the year.

3. **Quantitative Analysis.** This is a course in which the student becomes familiar with the various gravimetric and volumetric methods of analysis.

Elective for juniors in the B. S. course, and for seniors in the Ph. B. course, who have had course 2a. Three hours a week throughout the year.

4. **Organic Chemistry.** This course comprises analysis of organic compounds, the preparation of typical organic substances, and a thorough study of the principles and theories of organic chemistry.

Elective for seniors in the B. S. course, who have had course 3. Three hours a week throughout the year.

5. **Special Analyses.** This course includes quantitative analysis, both gravimetric and volumetric determinations of common elements, a thorough course in water analysis, comprising a study of proper sanitary conditions, as well as complete chemical analysis of various samples of water, collected by the student, and a short course in milk analysis.

Required of seniors in the sanitary engineering course. Two hours a week during the fall and winter terms.

6. **Honors.** Students who have completed course 3 and whose grades in all the work of the department meet the requirements, are eligible to honors in the subject of chemistry. Such students are required to do some special analytical work and to submit a thesis on the results of their investigations.

Biology and Geology

PROFESSOR STOLLER

1. **General Biology.** This course is intended to give the student a knowledge of living plants and animals, to afford mental training in the study of nature, and to give the student a grasp of the broader facts and principles of biological science in their general philosophical values. Recitations and laboratory work.

Required of sophomores in the B. S. course, three hours weekly throughout the year, and of juniors in the Ph. B. course during the first two terms.

2. **Animal Morphology.** This course is adapted for students who wish a somewhat advanced knowledge and training in biology, especially as a preparation for teaching or for the medical profession. The work is mainly in the line of comparative anatomy, and includes the dissection of several vertebrate types in detail. Some time is given to elementary histology and embryology, involving the technique of section-cutting, etc. The course includes the reading of texts in general zoology and embryology.

Elective for seniors in the A. B., Ph. B. and B. S. courses. Three hours (six hours of laboratory work) weekly throughout the year.

3. **Bacteriology.** Students who have elected course 2 may be permitted to take, in the third term, elementary practical bacteriology as an extra or in place of a part of the anatomical work.

4. **General Principles of Zoology.** The aim of this course is to use the data of zoology for their worth as contributing to liberal culture. The more general facts and principles of animal structure, function and development are reviewed and considered in their relation to the study of man. The scientific evidences of organic evolution and the theories of evolution of various authors are considered. Lectures.

Required of juniors in the A. B., Ph. B. and B. S. courses. Three hours weekly during third term.

5. **Sanitary Biology.** In this course those organisms especially bacteria, which bear a causal relation to disease and the recent applications in sanitary science of our knowledge of the nature of these organisms, are considered. Recitations and lectures accompanied by demonstrations.

Required of seniors in the B. E. course, general and sanitary divisions. Two hours weekly during the second term.

6. **General Geology.** The instruction in this course is adapted primarily to the study of the science as a branch of liberal culture, but enough practical work is included to afford a foundation for special study or for teaching. The work includes laboratory study in determining the common minerals and rocks, and some field work in structural and historical geology.

Required of juniors in the A. B. and B. S. courses; elective in the Ph. B. course. Three hours weekly in the first term.

7. **Field Geology.** This course is supplementary to the preceding. The geological formations readily accessible from Schenectady are inspected, fossils are collected and readings from the state geological reports and other literature of the science are made.

Required of Ph. B. students who elect the preceding course. It may be taken as an extra, by permission of the faculty, by A. B. and B. S. students who have taken the preceding course. Three hours weekly during third term.

8. **Economic Geology.** In this course, after a brief study of the principles of dynamic and structural geology, the work is related to the occurrence and distribution in the United States of building stones, mineral ores, coal and other economic products. Recitations, lectures and some laboratory work. Required of seniors in the B. E. courses. Two hours weekly during the first term.

9. **Honors.** Advanced courses leading to special honors in this department are offered to those students who are qualified to pursue them.

Physiology and Physical Training

DR. MCCOMBER

Human anatomy, physiology, hygiene and physical training are required in all courses. In the freshman year the work consists of recitations and lectures, demonstrated by means of the microscope, the manikin and the human skeleton. An attempt is made to give a practical course covering the essential facts of the subject with the idea of arousing in every student a genuine self interest, of developing a wholesome self respect without overwhelming him with the mass of details that must be considered in a close study of anatomy.

During the fall term of the sophomore year a course in hygiene is given designed to acquaint the student with practical laws concerning the preservation of health and to impress upon his mind the dependence of health upon the consistent observance of such laws. Knowledge is of little value unless it find some application. Lectures on first aid to the injured, bacteriology, contagious and infectious diseases and social purity form a part of the course.

It is the aim of the department to give the subject such a training in the methods of physical education that he may have a comprehensive knowledge of the subject, and to secure health, vigor and such harmonious development of the body as will fit it to resist disease, and prepare it for efficient service, both now and later in life.

Work in the gymnasium is required of freshmen only, but the organization of voluntary classes make it possible for all to secure the advantages of systematic exercise. The course in the gymnasium is so arranged as to give a knowledge of the different kinds of apparatus pertaining to physical training. Commencing with light work, consisting of free gymnastics, club, dumb-bell and wand exercises, the course leads through a graded series, involving heavier work as the student becomes fitted for it.

Freshmen are required to pass an examination in gymnastics at the end of the winter term, credit being based upon actual proficiency in the various exercises as indicated by such examination.

A physical examination of new students is made at the beginning of the year and corrective exercises are prescribed for the remedy of physical defects. Charts of the physical measurements showing the comparison of the individual with the normal development and hand books containing much valuable hygenic data are furnished upon payment of a small fee. All candidates for college teams are required to pass a satisfactory physical examination before they are allowed to compete in athletic contests.

It is the policy of the department, so far as the equipment will permit, to influence the entire student body to take an active part in athletic sports and gymnastics and not to cater to the exceptional athlete to the exclusion of those who are physically less perfectly equipped.

Lectures

It is the policy of the college to provide its students with the advantages of frequent lectures by specialists in the various departments of knowledge.

Library

The library occupies Nott Memorial Hall. It contains forty thousand volumes and includes the engineering and scientific library of the late Professor Gillespie, the collection of mathematical works made by the late John Patterson, of Albany; the library of the late Hon. Henry J. Cullen, of the class of 1860, and the library of ancient and classical language and literature of the late Professor Tayler Lewis. The income from a bequest of five thousand dollars left by the late Lemon Thomson, Esq., of Albany, of the class of 1850, is devoted to the purchase of books on American subjects, especially history and political science. An alcove, known as the Thomson Alcove, is reserved for these books. By the will of the late Rev. Oscar Blakeslee Hitchcock, of the class of 1852, a bequest of upwards of thirty thousand dollars was left to the college for the purchase of books, manuscripts, etc. A most important accession lately acquired is the Croes Engineering Library, the gift of Mr.

Edgar Beach Van Winkle of the class of 1860. The library is classified according to the Dewey decimal system and a dictionary card catalogue, on the Dewey plan, is now being prepared.

One hundred and fifteen periodicals and the transactions of many learned societies are received.

Library Rules

Hours: 8-1; 2-6; 7:30-9 from Monday to Friday. 8-1; 7:30-9 on Saturday.

The library will be closed on Sundays and legal holidays.

The library will be open during vacation at hours to be announced.

Loan of books: Reference, Cullen and valuable books are not to be loaned.

Reserved books may be loaned over night, i. e., from 9 p. m. to 8 a. m. There will be a fine of $1.00 per day or part of a day for each reserved book overdue.

Periodicals are regarded as reference books.

All other books may be loaned, not more than two at a time, for a period of two weeks, and may be once renewed, unless called for. A fine of ten cents per day will be charged for all books overdue and all library privileges will be withdrawn until the book is returned and the fine paid.

The Natural History Museum

PROFESSOR STOLLER, CURATOR

Dr. D. S. Martin, Honorary Curator of the Wheatley Collection of Minerals.

The collections have recently been transferred to the third floor of Nott Memorial Hall. The opportunity has been used for the re-inspection of all the material and for placing the collections in order with reference to their preservation and their educational use.

The Wheatley collection of minerals, presented to the college in 1858, by E. C. Delavan, Esq., contains 4,000 specimens, many

of which represent the more valuable forms. This collection has recently been carefully inspected by Dr. D. S. Martin of New York city. All of the specimens have been re-identified and the entire collection has been re-arranged and placed in order for exhibition and for study. It has also been enriched by additional specimens, some of them from the personal collection of Dr. Martin, now presented to the college, and others from the Brooks collection, a gift to the college from Mr. Alfred H. Brooks of the United States geological survey, in memory of his father, a graduate of the college, by whom the collection was made.

In geology there is a general collection of rocks and minerals, and a considerable collection of paleozoic and mesozoic fossils. The collections made by the geological department under the direction of Professor C. S. Prosser so increased the museum that there is plenty of material now available, especially for the careful study of the paleozoic rocks and fossils of the New York formations. These have recently been examined, re-arranged and placed in cases for exhibition by Dr. Martin.

In zoology, the collection of mounted birds numbers 311 specimens, representing 161 species of the bird fauna of the eastern United States. These have recently been carefully inspected, and re-labelled. A considerable number of specimens of Porto Rican birds, collected and presented to the college by Mr. Byron W. Reed of the class of 1906, and mounted by Mr. John R. Nowell of the class of 1905 have been added. Of mammals there is a collection of 57 skins, the gift of the U. S. National Museum, and a number of skulls, skeletons and mounted specimens. Fishes, amphibia and reptiles, especially of the local fauna, are represented by specimens in alcohol. In the department of invertebrates the collections of marine animals made by Dr. Harrison E. Webster are extensive, including sponges, corals, worms, crustacea and mollusks, the total number of species represented being over 5,000. The Wheatley collection of shells, presented by E. C. Delavan, Esq., consists of 8,000 specimens.

The botanical collections include a nearly complete set of local

flowering plants, the work of Professor Jonathan Pearson. To this there has since been added a complete set of the ferns and fern allies of Schenectady county. The flora of the United States is further represented by collections from Virginia, the Red River region of the southwest, and those made by Dr. Nevins in Alabama. The lower cryptogams are represented by a valuable collection of 2,300 specimens of fungi, the gift of Mr. J. B. Ellis, of the class of 1851. The herbarium also includes a considerable number of foreign plants, including representative collections from Germany, Spain, Asia Minor and England, as well as some specimens from Iceland, Norway, France and Switzerland. They have been sorted and distributed in a single series following the latest accepted sequence, that of Engler and Prantl's Naturliche Pflanzenfamilien, making the entire collection of some 8,000 or 10,000 specimens readily accessible for reference and study.

The museum is open to the public on Wednesday afternoon and Saturday morning. Visitors may be admitted at other times by making application to the college librarian.

CURRICULUM OF THE A. B. COURSE

	First Term	Second Term	Third Term
Freshman Year	4 Greek 4 Latin 3 French, or German 2 Rhetoric 4 Solid Geometry 1 Physiology Greek Prose Composition Latin Prose Composition	4 Greek 4 Latin 3 French, or German 2 Rhetoric 4 Algebra 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics	4 Greek 4 Latin 3 French, or German 2 Rhetoric 3 Trigonometry 1 Physiology Greek Prose Composition Latin Prose Composition 1 Gymnastics
Sophomore Year	3 Greek 3 Latin 3 German, or French 2 English and Rhetoric 2 History, or Mathematics 3 Physics 1 Hygiene	3 Greek 3 Latin 3 German, or French 3 English and Rhetoric 2 History, or Mathematics 3 Physics	3 Greek 3 Latin 3 German, or French 3 English and Rhetoric 2 History, or Mathematics 3 Physics
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

Those entering Coures A—see page 30, take French during freshman year and German during sophomore year. Those entering Course B—see page 30, take two years of that modern language not offered for admission.

For list of electives, see page 78.

CURRICULUM OF THE PH. B. COURSE

	First Term	Second Term	Third Term
Freshman Year	4 Latin 3 German 3 French 2 Rhetoric 4 Solid Geometry 1 Physiology Latin Prose Composition	4 Latin 3 German 3 French 2 Rhetoric 4 Algebra 1 Physiology Latin Prose Composition 1 Gymnastics	4 Latin 3 German 3 French 2 Rhetoric 3 Trigonometry 1 Physiology 1 Gymnastics
Sophomore Year	3 Latin 3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 1 Hygiene	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry	3 Latin 3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry
Junior Year	3 English and Rhetoric 3 Logic 3 Biology 7 Elective	3 English and Rhetoric 3 Psychology 3 Biology 7 Elective	3 English and Rhetoric 3 Ethics 3 Biology 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

For list of electives, see page 78.

CURRICULUM OF THE B. S. COURSE

	First Term	Second Term	Third Term
Freshman Year	3 French 3 German 2 Rhetoric 4 Algebra 3 Chemistry 1 Physiology	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics	3 French 3 German 2 Rhetoric 3 Analytic Geometry 3 Chemistry 1 Physiology 1 Gymnastics
Sophomore Year	3 German or French 2 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology 1 Hygiene	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology	3 German or French 3 English and Rhetoric 2 History or Mathematics 3 Physics 3 Chemistry 3 Biology
Junior Year	3 English and Rhetoric 3 Logic 3 Geology 7 Elective	3 English and Rhetoric 3 Psychology 3 Astronomy 7 Elective	3 English and Rhetoric 3 Ethics 3 Evolution 7 Elective
Senior Year	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective	1 Rhetoric 3 Economics 13 Elective

The figure at the left indicates the number of hours per week devoted to class work in the subject.

For lis of electives, see page 78.

SCHEDULE OF REQUIRED STUDIES IN THE ACADEMIC COURSES

Freshman Year

Elementary German 1 (3 hours).....T., Th., S., 8-9.
Elementary German 2 (3 hours).....T., Th., S., 9-10.
Elementary German 3 (3 hours).....M., W., F., 9-10.
Elementary German a (3 hours).....M., W., F., 8-9.
Intermediate German 1 (3 hours).....M., W., F., 8-9.
Intermediate German 2 (3 hours).....M., W., F., 9-10.
Intermediate German 3 (3 hours).....T., Th., S., 8-9.
Elementary French 1 (3 hours).....T., Th., S., 8-9.
Elementary French 2 (3 hours).....T., Th., S., 9-10.
Elementary French 3 (3 hours).....M., W. ,F., 9-10.
Elementary French 4 (3 hours).....M., W., F., 8-9.
Elementary French a (3 hours).....M., W., F., 9-10.
Intermediate French (3 hours).....T., Th., S., 9-10.
Greek (course A) (4 hours).....M., T., Th., S., 10-11.
Greek (course B) (4 hours).....M., T., Th., S., 9-10.
Latin (4 hours) .....W., F., 10-11; T., Th., 11-12.
Solid Geometry, Algebra and Trigonometry (4, 4, 3 hours) M., W., F., S., 11-12. (Omit S. in third term.)
Rhetoric (2 hours) T., Th., 1:30-2:30. (For AB; PhB); T., Th., 10-11 (For BS)
Physiology (1 hour) W., (1:30-2:30) (during first and third terms B. S. students will meet 2:30-3:30).
Algebra and Plane Analytic Geometry (4, 3, 3 hours) M., W., F., S., 10-11. (Omit S. in second and third terms.)
General Chemistry (3 hours) T., Th., 11-12; lab. F., 1:30-4:30.
Gymnastics (second and third terms).....M., T., 2:30-3-30.

Sophomore Year

Greek (course B) (3 hours) .....M., W., F., 8-9.
Greek (course A) (3 hours).....T., Th., S., 11-12.
Elementary German a (3 hours).....M., W., F., 8-9.

Hygiene (1 hour, first term).....T., 8-9.
Rhetoric (1 hour, second and third terms).....T., 8-9.
English (2 hours) .....Th., S., 8-9.
Physics (3 hours) .....M., W., F., 9-10.
Intermediate French 1 (3 hours).....M., W., F., 10-11.
Intermediate French 2 (3 hours).....T., Th., S., 10-11.
Junior French (3 hours) .....M., W., F., 10-11.
Intermediate German 1 (3 hours).....M., W., F., 10-11.
Intermediate German 2 (3 hours).....T., Th., S., 10-11.
Junior German (3 hours) .....T., Th., S., 10-11.
Latin (3 hours) .....M., W., F., 11-12.
General Chemistry (3 hours) T., Th., 11-12; lab. F., 1:30-4:30.
Qualitative Analysis (3 hours) .....T., Th., 1:30-4:30.
Biology (3 hours) ....T., Th., 11-12; lab., M. or F., 1:30-3:30.

Junior Year

Geology, Astronomy and evolution (3 hours)..T., Th., S., 8-9.
English (2 hours) .....T., F., 9-10.
Logic, Psychology and Ethics, (3 hours).....M., W., F., 11-12.
Biology (3 hours)....T., Th., 11-12; lab., M. or F.; 1:30-3:30.
Rhetoric (1 hour) .....S., 11-12.

Senior Year

Economics (3 hours) .....T., Th., S., 8-9.
Rhetoric (1 hour) .....S., 10-11.

SCHEDULE OF ELECTIVES FOR ALL COURSES

Two hours are required of sophomores.

A total of seven hours is required of juniors.

A total of thirteen hours is required of seniors.

The number of hours per week and the times of meeting are indicated after each subject.

Students may choose any subjects not conflicting. Subjects that conflict have been placed in the same group.

Sophomore Group

For limiting conditions, see statements of respective departments

History (2 hours) .....T., Th., 9-10.
Analytic Geometry[1 2] (2 hours).....T., Th., 9-10.
Solid Analytic Geometry and Differential Calculus[3] (2 hours) W., F., 8-9.

Junior Groups

For limiting conditions, see statements of respective departments

Group I

American History (3 hours) .....M., W., F., 8-9.
Solid Analytic Geometry, Differential Calculus[1 2] (2 hours) W., F., 8-9.

Group II

Latin[1 2] (2 hours).....M., W., 9-10.

Group III

Argumentation (2 hours) .....Th., S., 9-10.

Group IV

French (3 hours) .....M., W., F., 10-11.
Anglo Saxon (2 hours) .....W., F., 10-11.

Group V

Spanish (3 hours) .....M., W., F., 3:30-4:30.
Mathematical Physics (2 hours) .....M., W., 3:30-4:30.,
Field Geology[4] (3 hours) .....W., 1:30-4:30.
Physics Laboratory (2 hours) .....M., W., 1:30-3:30.
Shakespeare (1 hour) .....M., 1:30-2:30.
General Chemistry[1] (3 hours) .....T., Th., 11-12; F., 1:30-4:30.
Hebrew (3 hours) .....M., W., F., 2:30-3:30.

Group VI

Qualitative Analysis[2] (3 hours) .....T., Th., 1:30-4:30.
Quantitative Analysis[3] (3 hours) .....T., Th., 1:30-4:30.
Greek[1] (2 hours) .....T., Th., 1:30-2:30.

[1] For A. B. Course
[2] For Ph. B. Course
[3] For B. S. Course
[4] See statement of course

Group VII

Integral Calculus[3] (2 hours) .....T., Th., 11-12.

Group VIII

German (3 hours) .....T., Th., S., 10-11.

Group IX

General Geology, Astronomy, Evolution[2] (3 hours) T., Th., S., 8-9

Senior Groups

For limiting conditions, see statements of respective departments

Group I

Morphology (3 hours) .....M., W., F., 9-11.
European History (3 hours) .....M., W., F., 9-10.
German (2 hours) .....M., F., 10-11.
Greek[1] (2 hours) .....M., 11-12; W., 10-11.
Differential Equations (2 hours) .....W., F., 9-10.
Sociology (3 hours) .....M., W., F., 10-11.

Group II

General Geology (3 hours) .....T., Th., 10-11; S., 9-10.
Latin[1 2] (2 hours) .....T., Th., 10-11.
Comparative Politics and International Law (3 hours) T., Th., S., 9-10.

Group III

History of Philosophy (3 hours) .....T., Th., S., 11-12.
General Chemistry[1] (3 hours) .....T., Th., 11-12; F., 1:30-4:30.
Integral Calculus[1 2] (2 hours) .....T., Th., 11-12.

Group IV

Spanish[4] (3 hours) .....M., W., F., 3:30-4:30.
History and Philosophy of Education (2 hours) M., W., 3:30-4:30.

[1] For A. B. Course
[2] For Ph. B. Course
[3] For B. S. Course
[4] For those who have not had Spanish in the junior year.

Mathematical Physics (2 hours) .....M., W., 3:30-4:30.
General Chemistry[1] (3 hours) .....T., Th., 11-12; F., 1:30-4:30.
Organic Chemistry[3] (3 hours) .....M., W., 1:30-4:30.
Shakespeare (1 hour) .....M., 1:30-2:30.
Physics Laboratory (2 hours) .....M., W., 1:30-3:30.
Spanish (2 hours) .....M., W., 2:30-3:30.
Advanced Argumentation (2 hours) .....W., 1:30-3:30.
Hebrew[5] (3 hours) .....M., W., F., 2:30-3:30.
Hebrew (3 hours) .....M., W., F., 3:30-4:30.

Group V

Qualitative Analysis[1 2] (3 hours) .....T., Th., 1:30-4:30.
Quantitative Analysis[2 3] (3 hours) .....T., Th., 1:30-4:30.
English Poetry (2 hours) .....T., Th., 1:30-2:30.
French (2 hours) .....T., Th., 2:30-3:30.

Group VI

Advanced Psychology, Advanced Ethics and Evolution of Religion (3 hours) M., W., F., 8-9.

[1] For A. B. Course
[2] For Ph. B. Course
[3] For B. S. Course
[4] For those who have not had Hebrew in the Junior year

THE ENGINEERING SCHOOL

Introductory. The charter of Union University brings together under one corporate name and administration Union College, located at Schenectady, N. Y., and the Law School, the Medical College, the Dudley Observatory and the College of Pharmacy, all located at Albany, N. Y.

The engineering school forms a part of Union College. Its connection with the regular college courses and with the other members of the university group is considered an advantage, as it furnishes opportunities for general culture not usually available in a purely technical school.

Historical. When Union College was chartered, in February, 1795, the only American college west of the Hudson River were William and Mary, Princeton, Hampden-Sidney, Rutgers and Dickinson. These, as well as the New England colleges, were all denominational; Union was the first strictly non-sectarian American college, and its name was inspired in part by this novel characteristic. The first full professorship in natural science in an American college was founded at Union and it is a matter of special scientific interest that Prof. F. R. Hassler was called from this chair in 1811 to establish the United States Coast Survey.

The engineering school of Union College is one of the oldest technical schools of the country. Founded in 1845 with Prof. William M. Gillespie at its head, it at once took high rank, and for many years was one of the few engineering schools in America. From the first it appears to have been the evident policy of the school to adapt the thorough training of L'Ecole des Ponts et Chaussées, of Paris, France, where Prof. Gillespie had finished his technical education, to the demands of professional practice in a vigorous new country, where resources and opportunities were abundant, and where capital and professional precedent were wanting. From the characteristic tendencies impressed on the school at its foundation it has never departed, although it has endeavored to keep pace with the development in American technical education and with the increased demands on professional training. For many years civil engineering only was taught; then, as the principles of modern sanitary science came to be better understood and the possibilities of their further development and their utilization as life-saving agencies

were discerned, a course in sanitary engineering was established; and more recently a course in electrical engineering was added.

During its whole history the school of engineering at Union has stood for broad, fundamental training rather than for narrow specialization and during recent years, since its advanced entrance requirements have made room in the course, increased time and attention have been given to culture studies and to a larger proportion of academic training.

Local Advantages. Schenectady is a peculiarly favorable location for an engineering school. The city is on the Mohawk River, and is intersected by several steam railroads, a number of interurban trolley lines and the Erie Canal, furnishing many bridges and other engineering works. At Schenectady are also located the works of the General Electric Company and of the American Locomotive Company, each an extensive and leading industry in its respective line. Among other interesting engineering features, may be mentioned the city grade-crossings improvement recently completed at a cost of a million dollars, and the city waterworks, which contain in their outfit a system of ground-water wells and a recently installed set of electrically-driven multiple-stage centrifugal pumps, of twenty million gallons daily capacity. The neighboring cities of Albany, Troy and Cohoes, as well as the surrounding territory, offer numerous examples of good engineering and many features of value as aids in engineering training. Among these may be mentioned the scientific departments of the state government at Albany, comprising the state engineer's department, which includes also the new barge canal, the good roads division and the bureau for testing materials; the headquarters of the state water supply commission, which includes also the state river improvement work; the headquarters of the Public Service Commission for district No. 2; the state library, which is well supplied with technical and engineering works; the Albany city water filtration plant; at Troy, the Burden iron works and the Gurley engineering instrument manufactory; at Watervliet, the United States arsenal and gun factory; the water power developments and electric power transmission plants at Mechanicville, Spier Falls, Schaghticoke and Johnsonville; the hydraulic cement works at Glens Falls and at Howe's Cave; and the modern sewage disposal systems at Saratoga Springs, Ballston Spa and Scotia. The new barge canal will pass the Cohoes falls by a flight of locks and will pass Schenectady by a system of locks and dams, both permanent and movable, now under construction which will canalize the Mohawk River, calling for extensive and interesting engineering operations. All these sources of aid are utilized in the work of the school.

FACULTY

CHARLES ALEXANDER RICHMOND, D. D., LL. D.
President

BENJAMIN H. RIPTON, PH. D., LL. D.
Dean
Professor of History and Government

OLIN H. LANDRETH, A. M., C. E. Sc. D.
Professor of Civil Engineering

CHARLES P. STEINMETZ, A. M., PH. D.
Professor of Electrical Engineering

SIDNEY G. ASHMORE, A. M., L. H. D.
Professor of the Latin Language and Literature

FRANK S. HOFFMAN, A. M., PH. D.
Professor of Philosophy

JAMES H. STOLLER, A. M., PH. D.
Professor of Biology and Geology

EDWARD E. HALE, JR., PH. D.
Professor of the English Language and Literature

HOWARD OPDYKE, A. B.
Professor of Physics

EDWARD ELLERY, A. M., PH. D.
Professor of Chemistry

FRANK COE BARNES, A. M., PH. D.
Professor of Modern Languages

HORACE GRANT McKEAN, A. M.
Professor of Rhetoric and Public Speaking

JOHN LEWIS MARCH, A. M., PH. D.
Adjunct Professor of Modern Languages

STEWART A. McCOMBER, A. M., M. D.
Professor of Physiology and Director of Physical Training

JOHN BOYD KENNEDY, PH. D.
Professor of Economics

OLIN J. FERGUSON, M. E. E.
Associate Professor of Electrical Engineering

WILBERT A. GARRISON, A. M.
Assistant Professor of Engineering Mathematics

GEORGE D. LYON, B. S., C. E.
Assistant Professor of Civil Engineering

ELMER E. F. CREIGHTON, B. S., E. E.
Consulting Professor in Electrical Engineering

JAMES H. CUNNINGHAM, M. E. E.
Instructor in Electrical Engineering

MORLAND KING, M. E. E.
Instructor in Electrical Engineering

ALBERT S. EASTMAN, B. S.
Instructor in Chemistry

JOHN A. C. CALLAN, M. C. E.
Instructor in Engineering Drawing

MORTON COLLINS STEWART, PH. D.
Instructor in Modern Languages

EUGENE F. PARKER, M. A.
Instructor in Modern Languages

CHESTER H. YEATON, A. M.
Instructor in Engineering Mathematics

WARREN C. TAYLOR, S. B.
Instructor in Civil Engineering

JAMES K. HOWE, B. S., C. E.
Instructor in Engineering

J. L. R. HAYDEN
Lecturer on Arc Lighting and Photometry and
Supervisor of Electr. Eng. Thesis work

COURSES OF STUDY

General Education and Technical Training. In the training of a young man for his professional work two distinct methods are open. One is to separate his professional work from his general educational training and to complete the latter before the former is commenced. This is the plan followed in the professional schools of theology, law and medicine. The other plan is, after the student has reached a certain point in his studies to have him carry forward at the same time his general education and his technical training. This plan is the one generally followed in engineering schools, as it has been found by engineering educators and professional engineers to yield better results in practice than the former plan. The point selected at which the technical training shall commence is the beginning of the college course, the time of which is divided between general studies and technical studies. In the Union College engineering courses the time allotted to these two divisions is about equal, though the two are carried on simultaneously, the general training being given, however, more time in the early part of the course and less in the latter part.

Undergraduate Courses. Four undergraduate courses of study in engineering are offered, three extending through four years and one extending through six years:—(1) A four-year course in general engineering, which is intended to give the basis of a broad engineering education, including the fundamental principles underlying the special branches of the profession; (2) A four-year course in sanitary engineering which differs from the general engineering course by substituting special work in sanitary subjects for some of the general engineering studies; and (3) a four-year course in electrical engineering, in which the last two years are devoted to essentially mechanical and electrical engineering subjects.

These three courses are identical during the first two years, the sanitary course differing slightly from the general during the last two years, while the electrical course in its last two years differs widely from the other courses. The degree of Bachelor

of Engineering (B. E.) is given for the successful completion of any one of the above three courses.

A six-year course in general engineering is also offered comprising the above four-year course in general engineering, course (1), and the regular four-year Latin-scientific course of the academic department, with the subjects of the two courses properly interwoven during each term. The course thus offers a combined college and technical training with the subjects of the two properly correlated. The degrees of Bachelor of Engineering (B. E.) and of Bachelor of Philosophy (Ph. B.) are given on the satisfactory completion of this course.

Graduate Courses. In addition to the above undergraduate courses in engineering, two graduate courses and degrees are offered:

The degrees of Master of Civil Engineering (M. C. E.) and of Master of Electrical Engineering (M. E. E.) are given on the satisfactory completion of one-year graduate courses of study in civil engineering and in electrical engineering, respectively.

REQUIREMENTS FOR ADMISSION

The general conditions governing admission to all the engineering courses are stated in detail on pages 32-44.

EXPENSES, TERMS AND VACATIONS

For information regarding expenses, terms and vacations, see pages 131-132 and page 23.

STUDIES OF THE FOUR COURSES

The following is an outline of those studies which in general are common to the three four-year courses in general, sanitary, and electrical engineering and to the six-year general engineering and Latin-scientific course. The studies which are peculiar to each are outlined under the separate departments.

Following the distinction between the two kinds of training above mentioned, the studies here outlined are arranged under the two heads of general studies and technical studies.

General Studies

Physics. The instruction in physics comprises a series of lectures on experimental physics, accompanied by classroom and laboratory work. Physical laboratory work is required of all engineering students. See also page 62.

Chemistry. General chemistry is taught by lectures, recitations and laboratory work during the freshman and sophomore years and laboratory work in qualitative analysis is continued through the first term of the junior year. Sanitary engineering students, in addition to the above, take chemical laboratory work during the first and second terms of the senior year. See also page 64.

Astronomy. The instruction in astronomy includes physical astronomy, spherical astronomy and the theory of astronomical instruments. These studies are preparatory to the work in astronomical surveying and geodesy given in the general engineering course. In the electrical engineering course the work is confined to descriptive astronomy.

Biology. Physiology is a required study in each of the three engineering courses. Structural botany is given in the general and sanitary courses, and bacteriology is given in the sanitary course. Structural botany includes the microscopic study of the vegetable cell, the tissues and the tissue-system of the higher plants with special reference to the use of woods in the constructive arts. In bacteriology some of the common bacteria of water, air and soil are studied according to the methods of modern bacteriological work. The accompanying lectures treat of bacteria in regard to their place and role in nature and their relations to sanitary science. See also page 67.

Geology (not required in the electrical engineering course). This work comprises a course in economic geology, which includes the general principles of geology and a discussion of the occurrence and distribution of minerals and mineral materials for construction in the United States. See also page 67.

English. The instruction in English aims at a general acquaintance with English literature and a correct, clear and forcible use of the language. Rhetoric is studied throughout the freshman year. In the first term a summary review of diction to the development of thought by work upon kinds of compois given. In the second and third terms more attention is given sition and the paragraph. In the sophomore year English literature as represented by the work of the essayists and by Shakespeare is studied. In the senior year one of the required essays of each term will be upon a technical subject prepared under the direction of the professor of civil engineering, the object being to give the engineering student practice in the preparation of clear, concise and systematic reports on engineering subjects. See also pages 53, 55.

Modern Languages. All engineering students at the time of entrance must have had two years of either French or German. After entering they are required to pursue French and German each for one year. This will be advanced work for the language offered at entrance, and elementary work in the alternate language not offered. Some work in scientific French and scientific German is done during the latter part of the course. See also page 48.

History and Economics. American history throughout the junior year and economics during the first term of the senior year are required of all engineering students.

Economics, Political Science and International Law. General engineering students who elect "Option B" in engineering administration are required to have economics during the three

terms of the senior year, political science during the first two terms, and international law during the last term.

Physiology and Physical Training. See page 47.

Studies of the Six-year Engineering and Latin-Scientific Course. For the studies of this course not described above, see the curriculum on pages 46, 53, 55, 56, 60 58, 67, and the detailed descriptions as follows:—

Latin .....See page 47
English Literature ..... See page 53
Rhetoric .....See page 55
History, Sociology .....See pages 56, 60
Logic, Psychology .....See page 58
Biology, Geology .....See page 67

Voluntary Studies Any of the studies of the classical course or of the scientific course of the college may be taken by engineering students without extra charge, on approval of the faculty.

Mathematical and Technical Studies

The following mathematical and technical subjects are included in each of the three engineering courses, and the instruction therein is given in the general engineering department.

Mathematics. To the engineer the subject of mathematics is essential not only for its disciplinary training, but also for its practical applications and use. Both these features receive due consideration in the teaching of the subjects under this head, especial effort being made to incite the student to independent thinking, and to enable him to apply his knowledge of mathematics to his technical work, at the same time holding him to rigorous methods and logical conclusions.

The following courses are required:

Algebra, advanced, including elements of determinants. Required of Freshmen. Four hours weekly during first term.

Plane Trigonometry. Required of freshmen in addition to the trigonometry required at entrance. Two hours weekly during first term.

Spherical Trigonometry. Required of juniors in the general engineering course "Option A," and in the sanitary engineering course. Three hours per week during a part of the third term.

Analytic Geometry. Required of freshmen. Four hours weekly during second term, and three hours weekly during third term.

Calculus. Differential and integral calculus. Three hours weekly during third term of freshman year, three hours weekly during first and second terms, and two hours weekly during third term of sophomore year.

Analytical Mechanics. The subjects taught under this head are statics, dynamics, hydro-statics, hydro-dynamics, and pneumatics. These studies form the foundation for the technical studies of applied mechanics, strength of materials and stresses in framed structures, all of which are fundamental to one of the chief divisions of an engineer's duties, namely, that of designing. Required of sophomores. Three hours first term, two hours second and third terms.

Drawing and Descriptive Geometry. The instruction in this work extends through the entire course. In the first term of the freshman year the student is instructed in free-hand drawing and in freehand lettering. In the second term he is instructed in the use of drawing instruments, in orthographic projections and in construction of geometrical problems and instrumental lettering. In the third term freshman and first term sophomore he is given practice in plotting surveys made in the field. Further instructions in topographical drawing follows in the first term of the sophomore year. Descriptive geometry is begun in the second term sophomore and, in addition to instruction in the theory, some of the most common applications in practice are taught by the use of practical problems. Schroeder's models and the Oliver models, as well as the

models of intersections of the Paris Polytechnic School, are freely used. In the third term sophomore instruction is given in shades, shadows and perspective and in the theories of oblique projections.

Mensuration and Surveying. This work is begun in the second term of the freshman year by the study of pure and applied mensuration, together with the fundamental principles of error, precision and computations, illustrated by practice. In the third term the theory of surveying instruments and operations is taken up and illustrated by field practice with the chain, tape, compass, transit, level and rod. In the third term sophomores topographical surveying is commenced and instruction and practice are given in the use of the various methods and instruments.

As a preliminary to instruction in each branch of surveying a thorough study of the instruments employed is made, treating their geometrical, optical and mechanical relations; their adjustments and use; and the determination of their instrumental constants, errors and limits of precision. The classes are divided into small sections and directed by the instructors. Office computations, plotting and mapping are made adjuncts of the field survey.

Applied Mechanics and Materials. Applied mechanics is commenced in the first term of the junior year, and comprises the extension of analytical mechanics and the development of the methods of graphical analysis with their applications to engineering problems, operations and constructions, particularly the treatment of stresses, strains, deflections and deformations in elastic materials and structures due to extraneous forces.

In conjunction with this work is given the study of the production, preparation, strength and physical properties of the various engineering materials, including timber, stones, cement and lime mortar, cast iron, wrought iron and structural steel. Practice in the engineering laboratory is an important adjunct to this study.

This entire division, properly correlated, becomes the foundation of all rational engineering design and construction.

Engineering Law and Procedure. During the first and second terms of the freshman year and the third term of the senior year a series of lectures is given on topics pertaining to the training and the qualifications of engineers, and to the engineering profession. In the junior and senior years in "Option B," and in the third term of the senior year of "Option A," a course is given in the study of the elements of the law and principles of procedure in contracts, agency, corporations, commercial and financial transactions and industrial accounting and of the law relating to land boundaries and titles, water courses and surveys.

Thesis. Each candidate for graduation is required to present on or before the third Wednesday in May of his graduation year a satisfactory thesis on a subject that has been approved by the professors of civil engineering or of electrical engineering. This thesis must be original in its character and may be either a design for some engineering structure or plant, process or operation, or an independent investigation of some principle, problem or matter of engineering importance. Reviews or copies of existing structures, plants or processes, unless of special educational value or involving original investigation, will not be approved as subjects. This thesis is to be in a form prescribed at the time of approval of the subject, and is to be bound for deposit in the library of the engineering school, and must be presented in this shape on or before the stipulated date. The subjects, with outlines of the proposed treatment, must be submitted for approval not later than November first preceding graduation, and the work on the theses must be presented for inspection and criticism of the professor in charge of the department at intervals during progress.

Library

The college library contains the engineering and scientific library of the late Professor Gillespie and other valuable technical collections. See page 70.

GENERAL ENGINEERING DEPARTMENT

Two Alternate Courses. In the four-year general engineering courses two alternate courses or options are offered, either of which may be selected by general engineering students at the beginning of the junior year, and each of which extends through the junior and senior years. The first of these alternate courses, designated as "Option A," offers a broad, fundamental, general engineering training such as a thoroughly trained engineer should have before specializing in any of the branches of the profession. The other alternate course, designated as "Option B," while in the main identical with the former, differs from it by omitting some of the more technical subjects, such as stereotomy, kinematics, least squares, sewerage, geodesy and field astronomy, and by substituting therefor, sociology, the elements of law, political science and international law, the principles of finance and financial operations, the principles of business management and accounting, and additional work in history and in engineering law and procedure. The object of this alternate course is to offer to engineering students an opportunity better to qualify themselves for enginering positions of an executive or administrative character. These two options are also offered in the six-years general engineering course and extend through the fifth and sixth years.

The details of these two optional courses will be found later on pages 120, 121, 126, 127.

In addition to the studies common to all engineering courses previously described on pages 87-93, the following subjects are included in the general engineering course. Unless otherwise stated, the following studies are required in each of the two alternate courses in general engineering:

Drawing and Descriptive Geometry (continued). In the junior year work in drawing includes machine drawing and the solution of problems in graphical analysis. In the senior year the subject includes the work in engineering design and construction of the last two terms, and comprises a large amount of structural drawing in the development of the designs of engineering structures.

A course in stercotomy and stone cutting is given in the first term Senior, with drawings from the stereotomy models of the Paris Polytechnic School. Practice in blue printing is made a part of these courses.

Surveying (continued). Railroad surveying is treated in the third term of the junior year, and the students are given exercises in the proper field operations on railroad surveys, office and field location and staking out work for construction. The subject of railroad construction and equipment is not treated until the first term of the senior year.

Field and Laboratory Practice. In addition to the weekly field and laboratory exercises throughout the year, all freshman, sophomore and general junior engineering students will be given an uninterupted fifteen days' course in field-practice and laboratory work supplementary to the studies in which such practice is desirable. The course will begin on the day (Thursday) following Commencement and will continue through that and the two following weeks. The work will be so selected and arranged as not only to supplement the studies of the year, but also to give instruction and practice in the organization, operation and direction of work conducted by engineering parties. The practice will form a part of the spring term work.

Astronomy. A short course in descriptive and mathematical astronomy, occupying, with some preliminary work in spherical trigonometry, three hours during the spring term of the junior year.

Least Squares, Geodesy and Field Astronomy. This course is given three hours weekly, during the second and third terms of the senior year. After a study of the fundamental principles of the adjustment of errors and their use in finding the weights and probable errors and in establishing empirical formulas, a discussion of the figure of the earth, triangulation, base lines, and precise leveling is taken up, accompanied by field work which also includes the determination of time, latitude, and azimuth, with

ordinary instruments and with methods and instruments of an observatory.

Engineering Design. The course in applied mechanics and materials prepares the student to undertake the study of engineering design proper, which is pursued throughout the senior year; an important feature of this course is the work in bridges, railroads and water-power developments, architectural engineering, etc. The exercises in this line of work are, as far as possible, chosen from professional practice, and the student is expected to carry out, from assigned data and conditions, the preliminary study, determinations of stresses, types, dimensions and details, and to turn in the results in the form of working drawings, diagrams and memoirs. The course is preceded by a series of lectures on the principles and economics of designing. The department possesses a large collection of drawings and photographs of representative engineering structures from which students can form correct ideas of modern practice in the designing of details and in the methods followed on works of this class.

Water. The subject of water is considered from several standpoints. In the first term junior is given a laboratory course in chemistry, followed by a course in water analysis. In the third term junior is given a course in hydraulics, followed in the senior year by a fuller development of the subject as applied to rainfall, run-off and storage of water, in relation both to water power and to potable water supplies. This course is accompanied by a study of the sanitary aspects of the subject of water supply and its preservation from contamination. An outline study is also made of pumping engines. The new laboratory affords opportunity for experimental work on flow of waters through orifices and pipes, and for tests of pumps, etc.

Highways. The study of highways in the first term of the junior year comprises a consideration of the highways as an element in the transportation system of the state, the principles of its economic location and proper construction, a study of the various modes of construction and the materials employed, its

proper maintenance and systems of highway laws and administration.

As a preliminary to the study of highway location as well as of railroad route surveying, some consideration is given to the principles and fundamental laws of topographical types and forms and their relation to the various modes of earth sculpture.

Streets and Pavements. A study of the methods of laying out and grading streets and pavements and of the various street accessories, paving methods and materials and their treatment, with special reference to their economic and sanitary aspects, is also given during the first term of the junior year.

Motors and Motive Power. Following the work in thermodynamics and hydraulics of the third term of the junior year an outline course in motors and motive power is given in the first and second terms of the senior year, comprising a study of the sources of demand and supply of power, steam-boilers, steam-engines, steam turbines, water-wheels and turbines, gas-engines, electric motors and transmission of power by shafting, belting, rope-driving, compressed air and electricity. The new laboratory affords opportunity for efficiency tests of hydraulic and other forms of motors.

Electrical Machinery and Transmission. Following the instruction in electricity in the department of physics, general engineering students are given, during the second term of the junior year, a three-hour course in the fundamental principles and practice of electrical generators, motors, transformers, transmission and instruments.

Principles of Finance, Business, Accounting. General engineering students who elect "Option B" are given instruction in the principles of finance and financial operations, the principles of business and of industrial organization, and the principles of accounting and of cost-keeping during the second and third terms of the senior year.

Equipment

General Engineering Building

The new engineering building, the donation of Mr. Andrew Carnegie for the general engineering department, has recently been completed at a cost of $100,000. It is a handsome structure of modern design, built of gray and buff pressed brick with gray stone trimmings.

The building is of fireproof construction throughout, the only wood used being in the doors, windows, and floor surface. It covers an area of 67 x 137 ft. and is three stories in height, with a basement above the ground level, making it practically four stories.

The entire east end of the basement, 50 x 62 ft. in area, will be used as a hydraulic laboratory. It is equipped with a steel tank 5 ft. in diameter and 52 ft. high, extending to the roof, with a tight cover so that it can be used as either a gravity or a pressure tank. The base of the tank will be provided with connections for standard orifices of various sizes and shapes. Connections will also be provided so that turbines and other forms of water motors can be driven by water from the tank under different heads. This room also contains a concrete canal 5 ft. deep, 9 ft. wide and about 20 feet long, which will be extended out of doors to a total length of 100 ft. It will be arranged for the insertion of temporary dams at different points along its length, so that weirs may be used for the measurement of large flows of water. It is also to be used as a large measuring tank in connection with pump tests, and for various other hydraulic experimental purposes.

In the southwest corner of the basement is the cement laboratory, 46 x 26 ft. in area, equipped for the testing of cement, concrete, and similar structural materials.

The basement also contains a locker room, with 50 individual lockers for the use of students when working in the laboratories; and there is also a large and well-ventilated toilet room.

The northwest corner of the basement is taken up by a room for surveying instruments, with lockers, etc., for issuing equip-

ment to field parties. Ready access is obtained to this room by an outside entrance at the west end of the basement corridor. This instrument room is connected by a lift with a large instrument laboratory on the first floor, which will also be furnished and used as a computing room by surveying classes.

On the first floor, besides the large computing room just mentioned, there is a large office and a room for the use of the engineering faculty.

In the southeast corner is an engineering museum, where models of bridges and other engineering structures will be placed, so as to be accessible for inspection.

The museum is connected by sliding doors with the engineering library and reading room. Here will be placed the valuable Croes library recently donated to the department by E. B. Van Winkle of the class of 1860, and also the large collection of engineering drawings, etc., belonging to the department.

The first floor also contains two recitation rooms, and one drawing room for the use of the class in engineering design.

On the second floor the north half is taken up by two large lecture or society rooms, each of which can be divided by folding partitions into two recitation rooms of the usual size. The south half of this floor is taken up by the applied mechanics laboratory, 40 x 25 ft. and one large and one small recitation room. In the southeast corner is the sanitary engineering laboratory.

On the third floor are two large drawing rooms, each about 24 x 60 ft., and three smaller drawing rooms. All of these rooms are well lighted by windows and sky lights. On this floor is also a good-sized blue-print room, a photographic room, and a dark room.

Each floor contains two or more small private offices for the use of instructors; and the entire plan of the building is admirably adapted to the needs of the department.

Instruments and Apparatus

The department is supplied with field instruments of the best description, comprising a large theodolite, suitable for refined geodetic operations, transits, surveyors' compasses, pris-

matic compasses, Burnier's compass, solar compass, Y levels, plane tables, sextants, mountain barometers, aneroid barometer and a marine chronometer.

The extensive private collection of models and instruments belonging to the late Professor Gillespie was purchased for the engineering school.

The collection of models in descriptive geometry and stereotomy is very complete. The following are some of the most important:

The Olivier Collection. This consists of about fifty models, representing the most important and complicated ruled surfaces of descriptive geometry, particularly warped or twisted surfaces. Their directrices are represented by brass bars, straight or curved, to which are attached silk threads representing the elements or successive positions of the generatrices of the surfaces. Each of these threads has a weight suspended by it, so as always to make it a straight line. These weights are contained in boxes sustaining the directrices and their standards. The bars are movable in various directions, carrying with them the threads, still stretched straight by the weights in every position they may take; so that the forms and natures of the surface which they constitute are continually changing, while they always remain ruled surfaces. In this way a plane is transformed into a paraboloid, a cylinder into a hyperboloid, etc.

These models were invented by the late Theodore Olivier while professor of descriptive geometry at the Conservatoire des Arts et Métiers, in Paris. One set of them is now deposited there, and a second is in the Conservatory of Madrid. Copies of some of them are to be found in most of the polytechnic schools of Germany. The Union College set is the original collection of the inventor, having been made in part by his own hands, and, after his death, in 1853, retained by his widow till bought of her by Professor Gillespie, in 1855. It is more complete than that in the Paris Conservatoire. It may be worth noticing that the silver plates on the boxes, reading "*Inventé par Théodore Olivier,*" etc., were added by Madame Olivier, at her own expense, after the purchase, as a tribute to the memory of her husband, her own

words being, *"Je tenais à ce que chaque instrument portât le nom du savant dont la réputation passera à la postérité."*

Professor Bardin's (Paris) plaster models (seventy) of the intersections of prisms, pyramids, cylinders, cones, etc.

Schroeder's (Darmstadt) models (twenty) of elementary descriptive geometry. The planes of projection are in wood, and the lines and surfaces in metal; models illustrating shades and shadows.

Stone Cutting Models (twenty) in plaster, selected from those of L'Ecole Polytechnique of Paris.

Professor Bardin's models (ten) in plaster, of oblique arches.

Groined and cloistered arch models (ten) in wood and plaster.

Models of structures in stone, consisting of bridges, culverts, etc.

Winding-stair models in wood and plaster. Full sized models of voussoirs and skew-backs of an oblique arch.

Models in Topography. French and German plaster models, giving all the different forms of ground, accompanied by topographical drawings, showing how to represent these forms by contour lines; hatchings and shades from vertical and oblique light; models and maps in colored topography; a large model of Mount Cenis pass, showing the wagon road and contour lines.

Architectural Models. Models of the five orders of architecture from L'Ecole des Beaux Arts, Paris; portals; stairs; roofs; walls; buttresses; domes, etc.

Engineering Models. Schroeder's models of joints, brick bonds, etc.; spur wheels; bevel wheels; cranes; pile drivers; various forms of water-wheels; pumps; cylinders; valves; eccentrics; etc.; steam engines.

Casts of St. Venant's models showing the changes of form in bodies subjected to flexure. Full sized model of the liquid vein measured by Poncelet and Lesbro.

Models of bridges of various systems, comprising truss, suspension, tubular and arch bridges; Doyne's dynamometer bridge

models showing, by means of dynamometer, strains at different points; models of roof trusses, arranged for using the dynamometer to show the different stresses.

Models of fortifications, illustrating Vauban's system; shot, shell, etc.

Models of culverts, piers, abutments, culvert heads, wing walls, rail sections, etc.

Maps, Drawings, Etc. This collection embraces a large number of maps, plates, profiles, topographical drawings and spherical projections; about fifty thousand engravings, lithographs, photographs and detail drawings of engineering and architectural structures; working drawings of machines, bridges, buildings, etc.

Physical Apparatus. To illustrate the lectures in physics, the college has an extensive collection of apparatus. This has been secured largely from foreign makers and includes special pieces of apparatus constructed under the direction of the late Professor Foster, besides sets of apparatus of standard patterns by Koenig, Duboscq, Ruhmkorff, and others.

In Mineralogy. The Wheatley collection contains nearly 4,000 specimens of minerals, the result of the labors of Charles M. Wheatley. All of these have been labeled according to the nomenclature and order adopted by Dana. They are, without exception, open at all times to the students. They furnish an admirable means of practical illustration in mineralogy. Among the rare and valuable specimens are those of anglesite, cerusite, mimetite and calcuprite, which in American specimens are equalled only by those in the Britism Museum. There are many fine specimens representing the noble metals from all parts of the world. There are few known species of minerals of which the collection does not contain some specimens.

In addition to this there is a large series of unlabeled specimens for crystallographic and blow-pipe examination.

In Metallurgy. The college possesses a suite of ores of the useful metals, comprising over 1,000 specimens. These have been arranged to illustrate their mode of occurrence and geographical

distribution. In addition are the fluxes, fuels, etc., used in obtaining the metals from the ores, together with the slags and metals themselves in various forms. There is a large number of models and drawings of stacks, furnaces, etc.; also suites of specimen of wood, charcoal, mineral coal, peat, etc., for physical inspection; also specimens of most of the useful alloys.

In Chemistry. The chemical laboratory is furnished with tile-top desks and lockers, and all the modern apparatus necessary for work in general chemistry and qualitative and quantitative analysis. Ample hoods occupy one side of the laboratory, where the student may work with the disagreeable and poisonous gases. In the private laboratory of the professor of chemistry provision is made for any students who may desire to pursue advanced courses, either in volumetric analysis, water and milk analysis, organic chemistry, or any special work in connection with courses of other departments.

A large number of specimens of the materials used in the manufacture of the mineral and of some of the organic acids; the crude products themselves and the materials used in the manufacture of the alkalis, soaps, matches, black lead, candles, petroleum products; linseed, olive, castor, cottonseed and other oils; paper, porcelain, glass, fire and building brick, mortar and cements, beet and cane sugar, white lead and other paints, etc., etc., form a part of the permanent collections of the department.

SANITARY ENGINEERING DEPARTMENT

General Considerations. The extensive development of sanitary biology during recent years and the establishment on a firm, scientific basis of the germ-theory of disease have laid a secure foundation for the important specialty of sanitary engineering. Already the practical application of the principles in many lines of public utility, as well as in medicine and surgery, has resulted in a very marked decrease in the annual death rate. The most fruitful line of application of this recent and useful knowledge lies in the intelligent design, construction and operation of municipal public works and of systems of water supply, sewerage

and drainage, heating and ventilation of private residences, schools, hotels, hospitals and other public institutions and buildings.

General Scheme of the Course. The course in sanitary engineering differs from the general engineering course by omitting astronomical surveying, geodesy and railroad construction, and substituting therefor sanitary biology, heating and ventilation, house drainage and plumbing, sanitary codes and laws, and an increase in the amount of chemistry and chemical labroatory work.

Sanitary Conditions of Buildings. In the first and third term senior, respectively, are given courses in heating and ventilation and in house drainage and plumbing. The latter course will give special attention to the matter of water supply and of the removal of wastes from buildings in all situations, from the isolated country house to that in a thoroughly drained city.

Sewerage and Drainage. The study of the principles and practice of sewerage and sewage disposals is given during the last term of the senior year. The fundamental sanitary and constructive principles will be developed and a comparative study of the various systems as well as of the details of construction and maintenance receives careful attention. A course of lectures in the third term senior presents the principles upon which the laws touching the subject of the public health are based and the outlying principles which should govern the preparation of sanitary codes and regulations.

Graduate Course

Leading to the Degree of M. C. E.

This course of one year's graduate study, consisting of lectures, laboratory and research work is open to graduates of the general or the sanitary engineering course of Union College or of any other institution of a standing recognized by the faculty.

Correspondence regarding admission to the undergraduate courses should be addressed to the *Secretary of the Faculty,*

Union College, Schenectady, N. Y. Correspondence regarding admission to the graduate course in civil engineering may be addressed to

Dr. Olin H. Landreth
Professor of Civil Engineering
Schenectady, New York

ELECTRICAL ENGINEERING DEPARTMENT

Purpose and Methods. A course of instruction in electrical engineering was introduced in 1895, and in 1902 was re-organized and made into a separate department of the engineering school under the direction of Professor Charles P. Steinmetz, consulting engineer of the General Electric Company.

The course of studies offered by the department of electrical engineering aims at a thorough and broad scientific education of the prospective engineer, rather than the specific training of a specialist. The instruction, therefor, consists of three classes of studies. The general culture studies furnish such training as is now considered essential for every educated man, as languages, literature, history, etc. Such instruction extends over a large part of the first two years, and is then followed by a broad and general technical education, giving the student the fundamental principles and their application to all branches of engineering. Ultimately follows the specific instruction in electrical engineering, which, while it enables the student, after graduation, to enter the field of electrical engineering practice in the manufacturing or operating company or consulting engineer's office in a subordinate capacity only, has given him all the necessary requirements to gather in a few years' practice the knowledge needed for independent work of greater magnitude.

The instruction especially aims at a thorough understanding of the fundamental principles rather than a memorizing of numerous facts—that is, aims at quality, and not quantity—and as far as possible in all engineering instruction the subject is brought before the student in three different ways; by a theoretical lecture course with recitations, practical instruction in the electrical lab-

oratory paralleling the lecture course, and, following this, the application of the knowledge gained in lecture courses and laboratory to calculation and design in the drafting room. Finally, more independent work on the solution of engineering problems is undertaken by the students. These problems invariably require some research work; the systematic tabulation of the results with original conclusions constitutes the graduating thesis. Throughout the technical course, by work in the laboratory, some familiarity with the apparatus is given to the students before the technical side is taken up in the lecture course, so that when approaching the theoretical studies of electrical phenomena or apparatus the student is already able to appreciate the practical value and importance of the subject with which the theoretical investigations deal.

Through the active interest which the General Electric Company takes in technical education, an arrangement has been effected between the college authorities and the officials of the company by which the students in the junior and senior classes are admitted to the company's works at appointed times, under the direction of their instructor, with the privilege and opportunity of studying and inspecting the plant and operations and of being regularly instructed therein. The work has been systematically arranged, and is given simultaneously with the corresponding class and laboratory work, to which it forms an important and valuable adjunct.

List of Studies

In the following list of studies, only those subjects of the electrical engineering course which are not required in the other courses are described in detail. All the culture studies and most of the general engineering and scientific studies are pursued in common with the students of other engineering branches. Beginning with the junior year, however, the courses diverge. The electrical engineers take up a number of mechanical engineering subjects and continue them throughout the junior and first part of the senior year. In fact, during the junior year the mechanical engineering work may be considered as constituting

the major subject, though a considerable amount of time is also devoted to electrical engineering.

Studies also required in other courses are:

3. **American History** .....See page 57
3. **Rhetoric** .....See page 55
4. **Descriptive Chemistry**.....See page 64
3. **Physical Chemistry**.....See page 64
3. **Logic** .....See page 58
6. **Economics** .....See page 60
Engineering Law and Procedure.....See page 92

The mechanical engineering subjects not previously described are:

M.E.1. Hydraulics. First term, hydraulics and hydraulic machinery; second term, Hydraulic turbine design. Mr. Cunningham.

M.E.2. Steam Engines. Second term, theory of the steam engine; third term, steam engine design. Mr. King.

Other general subjects given only to electrical engineering students are:

C.E.1. Elements of Civil Engineering. The work and methods of the civil engineer. This course is given to broaden the ideas of the student, thus enabling the electrical engineer to value properly the labors of his colleagues in this allied department of the profession. Third term.

Seminar. Beginning with the junior year one hour per week is given in mathematical seminar. Practical engineering problems are proposed, in the solution of which it is necessary to utilize the field of mathematics previously covered. Mechanics, thermodynamics, hydraulics, electrical phenomena of permanent or transient form—all combining to make an inexhaustible field from which graded problems are selected. This is the practical application of algebra, trigonometry, calculus, etc. Associate Prof. Ferguson.

The electrical engineering studies include the following:

E.E.1. Engineering Mathematics. One lecture per week is given in the third term of the junior year in preparation for the more advanced work given by Dr. Steinmetz in his course for the senior year. Third term, Dr. STEINMETZ.

E.E.2. Direct Current Circuits and Apparatus. Students in electrical engineering devote a considerable part of the junior year to the study of the fundamental principles of the subject. Direct current phenomena are studied first, as this part of the subject is somewhat simpler and is readily brought within the grasp of the average student. This work includes the theory and practice of direct current generators and motors and auxiliary apparatus, taking into account also the principles of design. First and second terms, Mr. KING.

Alternating Current Circuits and Apparatus

E.E.3. Junior. Fundamentals of alternating current circuits and machines. Many problems are assigned in order to make the work specific and concrete. Second and third terms, Mr. CUNNINGHAM.

E.E.4. Senior. A continuation of E.E.3, becoming more advanced. Analyses and discussions of generators, synchronous motors, transformers, induction motors, series motors, convertors, higher harmonies, etc. First and second terms, Associate Prof. FERGUSON.

Electrical Laboratory

E.E.5. Direct Current Laboratory. The work under this head is parallel with E.E. 2, and includes all standard tests of direct current machines, and is supplemented by numerous experiments arranged with due regard to their general importance and scientific value. The machines with which the student has become more or less familiar in class work are here examined in detail and careful records made of efficiency, regulation, internal characteristics, commutation under varying loads, etc. First and second terms, Mr. CUNNINGHAM.

E.E.6. Alternating Current, Junior. The work done here in the junior year consists of an extensive series of experiments corroborating and explaining the theories of the lecture room. The exercises consist in investigation of voltage and current conditions on a variety of combinations of resistance, inductance and capacity in series and in multiple, the exploring of field flux and wave shapes of alternators, and the effect of inductance and capacity on wave shape, the use and calibration of meters, the potentiometer, the photometer, etc. Upon entering the senior year the student is thus equipped with the broad foundation in the underlying principles of electrical engineering, which is absolutely essential to a comprehensive study of the more intricate and special departments of the subject. Third term, Mr. CUNNINGHAM.

E.E.7 Alternating Current, Senior. In this course, complete tests are made on the apparatus studied, and the characteristics of the various machines are determined. The laboratory work deals with the transformer: ratio, impedance and core loss characteristic, regulation and heat runs, the synchronous motor and generator: amplitude and phase displacement of the various phases of multiphase machines, no load and load saturation, phase characteristics, pulsation, regulation and compounding curves, starting test, etc., the induction motor: determination and plotting of curves for power factor, speed, slip, torque, efficiency as function of speed, starting tests on motors with squirrel cage armatures and compensator, also on machines with variable rotor resistance, impedance and core loss curves and maximum output determination, the single phase induction motor, the use of the oscillograph, etc. First and second terms, Mr. CUNNINGHAM.

Electrical Apparatus Design

E.E.8. Direct Current Machines. When E.E.2 has been finished each student is directed to design a specified machine and is required to do this work in class and without other aid than that given by the instructor. Complete calculations, with curves,

where necessary, and working drawings of the machine designed, are required, and credit is given for accuracy, originality and neatness. Third term, Mr. KING.

E.E.9. Alternating Current Machines. This subject is a continuation throughout the senior year of the machine design begun during the junior year, and the two are handled in much the same manner. Transformers induction motors, alternating current generators, etc., are calculated and their layouts completed. As each type of machine is taken up, fundamental lectures are first given, outlining the requirements for successful construction and operation and supplying data for all computations. Individual work is then assigned to each student and is carried out under the personal supervision of the instructor. First, second and third terms, Associate Prof. FERGUSON.

E.E.11. Electric Lighting. Wiring, systems of distribution and their comparative economy and efficiency, standard types of incandescent lamps and arc lamps, recent developments in these lines, vacuum tube lamps, the arc, photometry, illuminating engineering, etc. Third term, Associate Prof. FERGUSON.

E.E.12. Technical Literature. For the engineer ordinarily to neglect technical literature of the day is to live in the past. In this course, students are required to report in class upon certain English, German, French or American publications assigned to them, reviewing briefly the best articles found in current numbers. There are also included library references to biographical sketches and research works of eminent men.

It is intended by this means that the student shall become broadly familiar with the sources of the best and the most recent technical literature; that he shall learn how to keep abreast of the times; that he shall acquaint himself with channels through which he may obtain information upon any particular subjects; that he shall be able to summarize any article he reads, picking out its salient points; that he shall receive practice in expressing his

thoughts clearly and concisely upon important subjects. First, second and third terms, Associate Prof. FERGUSON.

E.E.14. Electric Transmission. The subjects discussed here are long distance transmissions, line construction, systems, grouping of machines, control of phase, methods of compensation, maximum power supplied over line, line efficiency, copper efficiency, distributed capacity, inductance, resistance, leakage and natural period of transmission line, surging, resonance due to higher harmonics, balanced and unbalanced polyphase systems, transformations, lightning, lightning protection. The subject is subdivided in such a way that it may be considered that the first term covers the power plant and generation, the second term covers transmission and distribution, and the third term is devoted, mainly, to design and calculations for a power system. First, second and third terms. Mr. KING.

E.E.15. Electric Railways. The subject of electric railway engineering is treated in three sections: 1. From the point of view of the consulting engineer who, being retained by the promoters of a proposed railway, investigates the field and territory of the new line, advises as to probable earnings of line, lays route, prepares plans and specifications and has charge of construction. 2. From the point of view of the operating engineers who have charge of rolling stock and maintenance of service on the line. This includes a complete discussion of the equipment of modern electric railways, the various systems in vogue, sub-station equipment and in general the operation of electric railways. 3. The problem of the electric railway as it is presented to the designing electrical engineer is discussed. About half of the time devoted to railways is reserved for this section of the work. The questions of predetermination of railway motors from service characteristics, of train resistance and other quantities affecting the operation of electric trains are treated and the various alternating current railway motors which are being developed are discussed. Second and third terms, Associate Prof. FERGUSON.

E.E.17. Electrical Engineering Practice. This course of lec-

tures is designed to put the student into touch with the most recent developments of advanced engineering practice. It emphasizes the fact that an engineer must be well equipped and resourceful in order successfully to attack new problems. It is an outgrowth of what was formerly known as a lecture course by specialists. Second and third terms.

Among those who have consented to give lectures in this course for the current year are:

E. B. MERRIAM	C. E. EVELETH
H. M. HOBART	E. E. F. CREIGHTON
J. B. TAYLOR	L. RASK

E.E.18. Electrical Engineering Theory. Beneath the whole superstructure of electrical engineering is one broad base. This foundation is the same for alternating currents, or direct currents; motors or generators; power circuits or telephone circuits; local distribution or long distance transmission, permanent phenomena or transient phenomena. These courses of lectures lead to a better conception of relations existing among the seemingly, widely separated branches of the applied science and furnish foundation and incentive for subsequent advanced work. First, second and third terms, Prof. STEINMETZ and Asst. Prof. FERGUSON.

E.E.19. Thesis. (See page 93.) First, second and third terms.

Lectures by Engineers. To juniors and seniors of this course is available the notable privilege of becoming, upon the payment of a nominal fee, members of the Schenectady section of the American Institute of Electrical Engineers. Throughout the winter occur, before this section, a succession of lectures probably without an equal except before the national body itself. The value of this course cannot be overestimated. Plans for the current year include a meeting of the parent body under the auspices of the local section, at which about thirty valuable papers will be presented and discussed, covering at least a two days' session. Regular meetings will occur throughout the season.

A representative list of the speakers is added:

E. G. Acheson	Percy Thomas
J. B. Taylor	C. F. Scott
Prof. W. S. Franklin	W. S. Moody
W. S. Andrews	E. W. Rice
C. E. Eveleth	Dr. Elihu Thomson
Prof. C. P. Steinmetz	H. G. Reist
Dr. S. A. Moss	Prof. E. E. F. Creighton
Giuseppe Faccioli	C. W. Stone
A. B. Hendricks	J. J. Frank

Electrical Laboratory Equipment

The electrical engineering laboratory is a commodious, well-lighted building, and permits the arrangement and grouping of the machines in a flexible relation to each other.

The ground plan of the building is T-shaped. The upper bar of the T has two stories. The lower floor is devoted to three laboratory rooms, the largest of which is 101 ft. by 35 ft. outside dimensions. This is the main laboratory and extends from front to rear of the building.

A light well-ventilated drafting room occupies the major portion of the second floor, being 73 ft. by 27 ft. in dimensions.

The purpose of a college laboratory of electrical engineering is two-fold: To familiarize the student with the shape, appearance, relative proportions and construction of modern electrical apparatus, and to instruct him in the handling, assembling, testing and operation of electrical apparatus under normal and abnormal conditions.

Because of the great variety and large size of modern electrical apparatus, the former purpose can be fulfilled very incompletely only, even in the largest and best equipped college laboratories. Through the favorable disposition of the General Electric Company, by giving the electrical engineering students of Union College free access to the works and testing rooms, this purpose is admirably fulfilled here, and by frequent and regular inspection trips to the works and testing department of the General Electric Company under the direction of the col-

lege instructors, which trips constitute an integral part of the laboratory instruction, the students gain a very intimate knowledge of modern electrical apparatus of all types and sizes, not only when assembled and in operation and test, but also during their construction in the shops.

In equipping the college laboratory special consideration was therefore given to the selection only of such representative types of apparatus as can be handled, operated and tested by the students, and are of a size sufficiently large to correspond to modern practice, but not so large as to make the operation under abnormal conditions—that is, under conditions which as a rule are specially instructive—unsafe for the apparatus. All such machinery as the student can not be permitted to handle freely was excluded from the equipment.

Power is supplied from the following sources: A direct connected unit consisting of a Westinghouse gas engine and a direct current generator; a motor-generator set consisting of a 55-h.p. direct current motor direct connected to a 30 kw., 120-240 volt, thee-phase, 60 cycle alternator; a motor-generator set consisting of a 17:5 kw. direct current generator direct connected to a three-phase 220-volt induction motor; connection with the 550-volt direct current trolley circuit of the Schenectady Railway Company; connection with a three-phase 2300-volt power circuit of the Schenectady Illuminating Company. In the latter case voltage is reduced by banks of step down transformers, so that the students can handle the safe low tension circuits only.

A secondary supply is also secured by means of a group of lead plate storage batteries charged by a mercury arc rectifier upon the alternating current power circuit.

A very large number of various sizes of transformers are provided to give the students practical experience in connecting transformers for different ratios and for transformation between three-phase, quarter-phase, six-phase, etc., systems. The equipment further contains three-phase, quarter-phase and six-phase alternators and synchronous motors, the two characteristic types of induction motors, three and six-phase rotary converters, bipolar and multipolar generators, and numerous smaller

induction motors, converters and direct current motors and generators of different types. A constant current arc machine, with different types of arc lamps and a constant alternating current transformer, with series arc lamps, testing tables, switchboards, and numerous instruments of the indicating and the integrating type, are also provided for efficient instruction.

Among the recent additions to the laboratory are an oscillograph and a potentiometer. The former is the standard three galvanometer type, manufactured by the General Electric Company, with photographic and tracing attachments. With this instrument wave forms may be traced or photographically recorded and transient phenomena of the electric circuit studied and investigated. The potentiometer is an absolute standard for the calibration of electrical instruments and is similar to that used by the Public Service Commission of New York State.

Graduate Course

Leading to the Degree of M. E. E.

To student desiring to continue their studies a short time beyond the four-year course, a graduate course of one year is offered in which, besides instruction in higher branches of electrical engineering, there will be occasion to carry out original investigations under the supervision and with the assistance of specialists prominent in electrical engineering practice on subjects closely connected with the most recent advance of electrical engineering. In return for the assistance offered to the graduate students in their research work by prominent specialists such students may be required to devote a small part of their time to assisting the regular college instructors in laboratory instruction. This course leads to the degree of Master of Electrical Engineering, and is open to graduates of Union College or of other institutions approved by the faculty.

The options open to Union College graduates are:

1. Three terms' work in residence.

For this course registration is required at the college office for the three terms.

2. One half year of engineering work with the General Elec-

tric Company, supervised by the electrical engineering department of the college, and two terms of college work in residence.

For this course registration is required with the electrical engineering department before entering upon any accedited work, and at the college office for the two terms preceding the granting of the degree.

3. At least one and one-half years of engineering work with the General Electric Company, supervised by the electrical engineering department of the college, and a thesis representing a distinct advance in the science.

For this course registration is required with the electrical engineering department eighteen months before granting of the degree and at the college office for one term preceding the granting of the degree.

Graduates of other colleges must register at the college office for the full year preceding the granting of the degree. The course may be arranged, at the discretion of the department, to include a greater or lesser amount of work with the General Electric company.

Some of the subjects offered to the graduate students are:

Psychology	Sociology
Philosophy	Advanced calculus
Geology	Differential equations
Economics	Long distance transmission

Design and control of electric power systems of very great magnitude
Electric railway and traction, continued
Modern theory of electrical engineering, continued
Oscillating currents and high frequency phenomena
Transient phenomena, lightning and lightning protection
Wave transmission, with special application to telephony
Scientific foundations of electrical engineering
Electro-chemistry, Light and Illumination
Electrical engineering apparatus, Steam turbines
Storage batteries, Telephone engineering
Laboratory, Research work

Some of the lectures given by Professor Charles P. Steinmetz to graduate students are as follows:

Review: The electric, magnetic and dielectric circuit. Resistance, inductance, capacity and wireless telegraphy.

The law of electromagnetic induction; electric apparatus and includes:

The characteristic curves of electrical apparatus, machines and circuits, magnetic characteristic: saturation and excitation curve. Load characteristic: regulation curve, field characteristic, compounding curve. Phase characteristic of alternating current apparatus; Efficiency, no load and load losses.

Commutating machines: direct current generators and motors.

Synchronous machines: alternators and synchronous motors and converters.

Induction machines: induction motors and generators, single phase and polyphase repulsion motors and generators.

Rectifying machines: the arc machine, constant potential and constant current rectification, arc rectifiers and electrilytic rectifiers.

Transformers and reactors: constant potential and constant current.

Meters: indicating, integrating and recording.

Transient phenomena: starting and building up of direct current generators; Effect of field inductance and fluctuating load. Starting of synchronous machines.

Starting of transformers, of inductive circuits, of circuits containing inductance and capacity, transmission lines, short circuit phenomena of circuits containing inductance and capacity. Transmission lines, short circuit oscillations.

Short circuit current of direct and alternating current generators.

Hunting or surging of synchronous machines, motors and converters. Hunting or surging of induction machines, of direct current motors and generators.

Alternating current series motors.

In addition to this a course is given on the design of electrical apparatus, in which the students carry out the design of a number of typical machines and apparatus under the personal direction of Professor Steinmetz; and the course includes the

discussion of all the elements entering into the practical design and construction.

Graduate Course

Leading to Degree of Ph. D.

There has been recently established a course of study leading to the degree of Doctor of Philosophy. This degree is meant to signify breadth of training and high attainment, rather than the completion of a certain amount of work or the study of subjects chosen for a definite period of time. It will be conferred upon the candidate upon the satisfactory fulfillment of the following conditions:

1. The applicant for admission to this course must present the degree of Master of Electrical Engineering or an equivalent degree.
2. The candidate must spend at least two years in resident work under direction of the faculty.
3. The major subject of study must be electrical science.
4. Two minor subjects of study must be pursued, one of which is to be philosophy.
5. At the completion of the course, and two months before the conferring of the degree, a suitable thesis must be presented to the head of the electrical engineering department, representing original work and indicating strength and ability in independent investigation.
6. Fifty printed and bound copies of this thesis must be deposited in the college library before the successful candidate may receive the diploma for his degree. The degree may be conferred, however, before such copies are deposited, upon the presentation to the treasurer of proper security for their provision. In this case, a bound type written copy shall be placed in the library previous to the conferring of the degree.

Correspondence regarding admission to the undergraduate courses should be addressed to the Secretary of the Faculty, Union College, Schenectady, N. Y. Correspondence regarding admission to the graduate course in electrical engineering may be addressed to

DR. CHARLES P. STEINMETZ
Professor of Electrical Engineering
Schenectady, N. Y.

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING

	First Term	Second Term	Third Term
Freshman Year	3 French 3 German 2 Rhetoric 3 Freehand Drawing 4 Algebra 1 Physiology 2 Trigonometry Lectures Summer Vacation Work	3 French 3 German 2 Rhetoric 4 Analytic Geometry 2 Mensuration 3 Mechanical Drawing 1 Gymnastics	3 French 3 German 2 Rhetoric 3 Calculus 3 Analytic Geometry 2 Surveying and Plotting 1 Physiology Field and Laboratory Work, following Commencement
Sophomore Year	1 Rhetoric 3 Calculus 3 Mechanics 3 Physics 3 Chemistry 2 English Literature 1 Hygiene 2 Topographical Surveying Summer Vacation Work	1 Rhetoric 3 Calculus 2 Mechanics 4 Phsyics 4 Chemistry 2 English Literature 3 Descriptive Geometry	1 Rhetoric 2 Calculus 2 Mechanics 4 Physics 4 Chemistry 2 English Literature 3 Descriptive Geometry; Shades and Shadows Field and Laboratory Work, following Commencement

The figure at the left indicates the number of hours per week devoted to class work in the subject.

The freshman and sophomore years are identical in the general, sanitary and electr cal engineering courses.

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 4 Applied Mechanics 4 Chemical Laboratory 4 Highways and Pavements 3 Topographical Surveying and Mapping Summer Vacation Work	1 Rhetoric 2 American History 5 Mechanics of Materials and Eng. Laboratory 3 Kinematics Machine Drawing 3 Electricity 2 Thermodynamics 1 Natural Perspective	1 Rhetoric 2 Amer. Hist. 4 Stresses and Graph. Analysis 3 Hydraulics 3 Route Surv. 3 Spher. Trigonometry and Astronomy 2 Stereotomy Inspection Trips Field and Laboratory Work following Commencement
Senior Year	3 Economics 5 Railroad and Trolley Road Construction 4 Engineering Stresses 2 Economic Geology 2 Motors and Motive Power 2 Engineering Mathematics One Literary Essay One Technical Essay Inspection Trips	2 Sanitary Biology 3 Method of Least Squares 4 Engineering Design and Construction 2 Water Supply Engineering 3 Motors and Motive Power 2 Engineering Mathematics 2 Building Construction One Literary Essay One Technical Essay	3 Engineering Law and Procedure 3 Geodesy and Field Astronomy 2 Outlines of Architecture 4 Engineering Design and Construction 5 Water Supply Sewerage and Sewage Disposal Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE

GENERAL ENGINEERING, OPTION B

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 2 English History 4 Applied Mechanics 4 Highways and Pavements 3 Chemical Laboratory 3 Topographical Surveying and Mapping Summer Vacation Work	1 Rhetoric 2 American History 2 English History 3 Elements of Law 5 Mechanics of Materials and Eng. Laboratory 3 Electrical Machinery 2 Thermodynamics	1 Rhetoric 2 Amer. Hist. 2 French History 3 Law of Prop. and Cont. 4 Stresses and Graph. Analysis 3 Route Surv. 3 Hydraulics Inspection Trips Field and Laboratory Work, following Commencement
Senior Year	3 Economics 3 Political Science 3 Principles and Laws of Corporations 2 Motors and Motive Power 4 Engineering Stresses 2 Engineering Mathematics 2 Economic Geology One Literary Essay One Technical Essay Inspection Trips	3 Economics 3 Political Science 2 Principles of Finance and Financial Operations 3 Motors and Motive Power 2 Engineering Mathematics 4 Engineering Design and Construction 2 Building Construction One Literary Essay One Technical Essay	3 Economics 3 International Law 3 Principles of Administration 4 Engineering Design and Construction 2 Outlines of Architecture 3 Principles of Accounitng Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE B. E. COURSE

SANITARY ENGINEERING

Freshman and Sophomore Years as in General Course, page 119.

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 2 American History 4 Applied Mechanics 3 Chemical Laboratory 4 Highways and Pavements 3 Topographical Surveying and Mapping Summer Vacation Work	1 Rhetoric 2 American History 5 Mechanics of Materials and Eng. Laboratory 3 Kinematics Machine Drawing 3 Electricity 2 Thermodynamics 1 Natural Perspective	1 Rhetoric 2 American Hist. 4 Stresses and Graph. Analysis 3 Hydraulics 3 Route Surv. 3 Spher, Trig. and Astron. 2 Stereotomy Inspection Trips Field and Laboratory Work following Commencement
Senior Year	2 Motors and Motive Power 4 Engineering Stresses 3 Heating and Ventilation 3 Chemical Laboratory 2 Economic Geology 3 Economics One Literary Essay One Technical Essay Inspection Trips	3 Motors and Motive Power 4 Engineering Design and Construction 2 Water Supply Engineering 2 Chemical Laboratory 2 Sanitary Biology 3 Electives One Literary Essay One Technical Essay Inspection Trips	3 Engineering Law and Procedure 5 Engineering Design and Construction 5 Sewerage Sewage Disposal 1 House Draining and Plumbing 1 Sanitary Codes and Laws 2 Electives Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

The studies of the junior year are identical with those of Option A in the general engineering course.

CURRICULUM OF THE B. E. COURSE

ELECTRICAL ENGINEERING

Freshman and Sophomore Years as in General Course, page 119.

	First Term	Second Term	Third Term
Junior Year	1 Rhetoric 1 Seminar 2 Amer. Hist. 2 Elec. Lab. 3 Direct Current Circuit and Apparatus 3 Hydraulics and Hydr. Mach. 4 Applied Mechanics 4 Descriptive Chemistry Summer Vacation Work	1 Rhetoric 1 Seminar 2 Amer. Hist. 2 Elec. Lab. 3 Direct Current Circuit and Apparatus 2 Hydraulic Turbine Design 3 Theory of Steam Engine 3 Altern. Cur. Circuits and Apparatus 3 Physical Chemistry	1 Rhetoric 1 Seminar 2 Amer. Hist. 2 Elec. Lab. 1 Mathematics 3 Elect. Apparatus Design 2 Elements of Civ. Eng. 2 Steam Engine Design 3 Altern. Cur. Circuits and Apparatus 3 Elec. Lighting
Senior Year	3 Economics 2 Electrical Laboratory 2 El. Eng. Theory 3 Transmission and Gen. 2 Elec. Apparatus Design 2 Engineering Mathematics 3 Logic Gas Eng. and Steam Turb. 3 Altern. Cur. Circuits and Apparatus One Literary Essay One Technical Essay Summer Vacation Work	3 Elec. Ry. 2 Electrical Laboratory 2 El. Eng. Theory 3 Transmission and Distrib. 2 Elec. Apparatus Design 2 Engineering Mathematics 2 Elec. Eng. Practice 4 Altern. Cur. Circuits and Apparatus One Literary Essay One Technical Essay	3 Engineering Law and Procedure 2 El. Eng. Theory 3 Transmission Calculations 3 Elec. Apparatus Design 2 Tech. Literature 2 Elec. Eng. Practice 5 Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING

Entrance requirements are the same as for General Engineering Course and Latin-Scientific Course

	First Term		Second Term		Third Term		
First Year	4 *Fr* Latin	*ls*	4 *Fr* Latin	*ls*	4 *Fr* Latin	*ls*	First Year
	3 *Fr* French or German	*ls, e*	3 *Fr* French or German	*ls, e*	3 *Fr* French or German	*ls, e*	
	2 *Fr* Rhetoric	*ls, e*	2 *Fr* Rhetoric	*ls, e*	2 *Fr* Rhetoric	*ls, e*	
	4 *Fr* Algebra	*e*	4 *Fr* Anal, Geom.	*e*	2 *Fr* Anal. Geom.	*e*	
	3 *Fr* Free Hand Drawing	*e*	2 *Fr* Mensuration	*e*	3 *Fr* Calculus	*e*	
	1 *Fr* Physiology Lectures	*ls, e*	1 *Fr* Physiology	*ls*	1 *Fr* Physiology	*ls, e*	
	Summer Vacation Work		1 *Fr* Gymnasium Lectures	*ls, e*	2 *Fr* Surveying	*e*	
Second Year	3 *So* Latin	*ls*	3 *So* Latin	*ls*	3 *So* Latin	*ls*	Second Year
	3 *Fr* German or French	*ls, e*	3 *Fr* German or French	*ls, e*	3 *Fr* German or French	*ls, e*	
	2 *So* English & Rhet.	*ls*	3 *So* English & Rhet.	*ls*	3 *So* English & Rhet.	*ls*	
	3 *So* Calculus	*e*	3 *So* Calculus	*e*	2 *So* Calculus	*e*	
	2 *So* Surveying	*e*	3 *So* Chemistry	*ls, e*	5 *So* Chemistry	*e*	
	3 *So* Chemistry	*ls, e*	3 *Fr* Mechanical Drawing	*e*	1 *Fr* Trigonometry	*e*	
	1 *So* Hygiene	*ls, e*					
	Summer Vacation Work						

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Fr.*—freshman work, *So.*—sophomore work; *ls* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

	First Term	Second Term	Third Term	
Third Year	3 *So* German or French *ls, e* 3 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *Jr* Chem. Lab'y *e* 2 *So* English Hist. *ls* 3 *So* Mechanics *e* Summer Vacation Work	3 *So* Germ. or French *ls, e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* English Hist. *ls* 2 *So* Mechanics *e*	3 *So* German or French *ls, e* 4 *So* Physics *e* 3 *Jr* English & Rhet. *ls* 3 *So* Descrip. Geom. *e* 2 *So* French Hist. *ls* 1 *So* Mechanics *e* 3 *So* Topog. Surv. *e*	Third Year
Fourth Year	4 *Jr* App. Mechanics *e* 5 *Jr* Topog. Surv. *e* 3 *Jr* Logic *ls* 3 *E Jr* American Hist. *ls* 3 *Jr* Biology *ls* Summer Vacation Work	5 *Jr* Mechs. of Mat. and Eng. Lab'y *e* 2 *Jr* Thermodyn's *e* 3 *Jr* Psychology *ls* 3 *E Jr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *Jr* Nat. Perspec. *e* 1 *So* Elec. Lab'y *e*	4 *Jr* Stresses *e* 3 *Jr* Hydraulics *e* 3 *Jr* Ethics *ls* 3 *E Jr* American Hist. *ls* 3 *Jr* Biology *ls* 1 *So* Elec. Lab'y *e*	Fourth Year

The figure at the left indicates the number of hours per week devoted to class work in the subject. *So.*— sophomore work, *Jr.*— junior work; *ls* shows that the work is taken from the regular four-year Ph.B. course; *e* that the work is taken from the regular four-year B. E. course.

Students offering French at entrance will take French during the first year and German during the second and third years; but students offering German at entrance will take German during the first and second years and French during the third year.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

After the completion of the fourth year, students in this course are given the choice of two optional courses A and B. The details of these optional courses are here given.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING, OPTION A

	First Term	Second Term	Third Term
Fifth Year	3 *E Sr* European Hist. *ls* 3 *E Sr* Comparative Politics *ls* 3 *Sr* Economics *ls, e* 4 *Sr* Stresses *e* 2 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *E Jr* Gen. Geology *ls* Summer Vacation Work	3 *E Sr* European Hist. *ls* 3 *E Sr* Comparative Politics *ls* 3 *Sr* Sociology *ls* 3 *Jr* Kinematics and Machine Draw. *e* 3 *Sr* Motors and Motive Power *e* 1 *Sr* Rhetoric *ls* 3 *Jr* Elect. Machinery *e*	3 *E Sr* European Hist. *ls* 3 *E Sr* Internat. Law *ls* 3 *Sr* Sociology *ls* 3 *Jr* Route Surv. *e* 3 *Jr* Spher. Trigon. and Astronomy *e* 1 *Sr* Rhetoric *ls* 2 *Jr* Stereotomy *e*
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ. *e* 3 *Sr* Principles of Aesthet. Design 1 *Jr* Elements of Law *e* 2 *Sr* Econ. Geology *e* 3 *Jr* Highways and Pavements *e*	4 *Sr* Eng. Design *e* 2 *Sr* Water Supply *e* 2 *Sr* Build. Const'n *e* 2 *Jr* Elements of Law *e* 3 *Sr* Least Squares *e* 3 *Sr* Bacteriology	2 *Sr* Outlines of Architecture *e* 4 *Sr* Eng. Design *e* 5 *Sr* Water Supply and Sewerage *e* 3 *Jr* Law of Prop. and Contracts *e* 3 *Sr* Geodesy and Field Astron. *e* Thesis

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*— junior work. *Sr.*— senior work; *ls.* shows that the work is taken from the regular four-year Ph B. course; *e* that the work is taken from the regular four-year B. E. course.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

CURRICULUM OF THE SIX-YEAR B. E.-PH. B. COURSE

GENERAL ENGINEERING, OPTION B

	First Term	Second Term	Third Term	
Fifth Year	3 *E Sr* European Hist. *ls* 2 *E Sr* Comparative Politics *ls* 3 *Sr* Economics *ls, e* 1 *Sr* Rhetoric *ls* 1 *Jr* Elements of Law *e* 4 *Sr* Stresses *e* 2 *Sr* Econ. Geology *e* 2 *Sr* Motors and Motive Power *e* Summer Vacation Work	3 *E Sr* European Hist. *ls* 2 *E Sr* Comparative Politics *ls* 3 *Sr* Economics *ls* 1 *Sr* Rhetoric *ls* 2 *Jr* Elements of Law *e* 3 *Jr* Elec. Machinery *e* 3 *Sr* Motors and Motive Power *e*	3 *E Sr* European Hist. *ls* 2 *E Sr* Internat. Law *ls* 3 *Sr* Economics *ls* 1 *Sr* Rhetoric *ls* 3 *Jr* Law of Prop. and Contracts *e* 3 *Jr* Route Survey *e* 2 *Jr* Stereotomy *e*	Fifth Year
Sixth Year	6 *Sr* R. R. & Trolley Const'n & Econ. *e* 3 *Sr* Prin. of Law of Corporations *e* 3 *Sr* Prin. of Aesthet. Design 3 *Jr* Highways and Pavements *e*	4 *Sr* Eng. Design *e* 4 Eng. Projects 2 *Sr* Prin. of Finance and Financial Operations *e* 2 *Sr* Building Construction *e* 3 *Sr* Bacteriology	2 *Sr* Outlines of Architecture *e* 4 *Sr* Eng. Design *e* 5 *Sr* Water Supply and Sewerage *e* 3 *Sr* Principles of Accounting *e* 3 *Sr* Principles of Administration *e* Thesis	Sixth Year

The figure at the left indicates the number of hours per week devoted to class work in the subject. *Jr.*—junior work, *Sr.*—senior work; *ls.* shows that the work is taken from the regular four-year Ph. B. course; *e* that the work is taken from the regular four-year B. E. course.

Subjects preceded by *E* are taken from the elective list, but are required in this course.

ATTENDANCE AND STANDING

Registration. Every student must report at the registrar's office at the beginning of each term and register college or local residence.

Any change of residence during the term must be reported at once, in conformity with the regulation made by the treasurer's office.

Changes of Course. Students are not permitted to pass from one course to another, or to take any studies out of their regular order, without the specific authorization of the faculty.

Chapel. Morning worship is held in the chapel every college day and attendance is required of all students.

Reports. A daily record of scholarship and of attendance at class and chapel is kept, and is transmitted at the close of each term, or more frequently, to the student's parent or guardian.

Standing. There are four grades of scholarship:—from 9 to 10 inclusive, first grade; from 8 to 8.9, second grade; from 7 to 7.9, third grade; from 6 to 6.9, fourth grade. A student who receives a mark of 4 to 5.9 is reported as conditioned; below 4, as failed. In the mathematical studies of the engineering course the sustaining mark is 7, and any mark below 5 indicates failure.

A student who is reported as having failed in any subject must take that subject again in class; or he may be required, at the option of the department concerned, to make up the subject under an approved tutor, in such manner as the department may designate, and to pass an examination in it at the second conditions examination after the imposition of the mark of failure.

Those receiving the three highest marks for the whole course in the engineering department and the seven highest marks in the other departments are entitled to appointment as commencement orators.

Absences in General. Absences are entered, in every course, against a student from the beginning of a term until he reports his return to the registrar.

Absences are recorded as of three kinds:—allowed, excused and unexcused. Excuses must be obtained from the committee

on absences, which meets every Monday afternoon from two to five o'clock.

Class-room Absences. Attendance at all exercises is required and it is expected that no student will be absent except in case of unavoidable necessity.

Applications for excuses must be made to the committee on absences the first Monday following the date of absence.

No excuse remits any work of the term. The work lost by reason of excused absence must be made up in a manner satisfactory to the head of the department concerned, unless the nature of the work renders this impossible, in which case the student's grade will suffer.

After a number of unexcused absences equal to three weeks of recitations in any subject, the student is not allowed to continue his work in that subject, but must take it with the succeeding class.

Chapel Absences. Twelve absences without excuse are allowed each term. All absences after the first twelve lower the standing at the rate of one unit for every two absences.

No absences are excused except for protracted illness or for reasons in every way exceptional.

Applications for excuse from chapel for a term must be made within the first two weeks of that term.

In the determination of a student's general, standing marks for chapel attendance are counted as the equivalent of a one hour per week recitation. They affect the granting of scholarships and the selection of honor men.

Conditions. Students who may be admitted with entrance conditions must remove them not later than the March examinations. Those who fail to meet this requirement are classed as irregular students. Those who fail to remove all entrance conditions before the beginning of the next college year will not be admitted to any of the work of that year. No student who has any conditions unsatisfied at the close of the conditions examinations in September at the opening of the college year, is permitted to continue with his class without the express authorization of the faculty.

Conditions not removed at the next conditions examination held after their imposition must be made up in class at the first opportunity, and this work takes precedence of the regular work in case of conflict in the schedule. No senior who has failed to make up all his back work by the end of the second term of senior year can be recommended for a degree, except by special vote of the faculty.

Examinations for the removal of conditions occur on the Saturday next preceding the opening of the fall term, and on the first Saturday in December, March and May, as indicated in the college calendar. Registration for these examinations closes at 12 M. on the Saturday next preceding the date set for each. A fee for each examination to be taken must be paid at the time of registration, at the college office.

Students who have been excused by the dean, in writing, from any term examination are reported "Not examined" and may be examined later, at the option of the instructor, but such examination cannot be postponed beyond the first conditions examinations after such report. A failure to pass is regarded as a condition and must be made up at the next following conditions examination.

Unless excused in writing by the dean, students absent from term examinations are reported as "Not sustained," or "Failed."

Any student permitted by the faculty to anticipate or defer a term examination is required to pay a fee for each special examination made necessary.

A failure to report at any appointed examination is regarded as a trial, unless previously excused.

Irregular Students. Students who are seriously deficient in standing may be dropped to a lower class, or if the deficiency is such as to leave prospect of regaining class standing, may be rated as irregular students. Irregular students have no class relation or class privilege; they are debarred from competition for prizes and from the attainment of special honors.

The evidence that a student's continuance in college is resulting in no advantage to himself, or in harm to others, will occasion his separation from the institution.

EXPENSES

Registration fee	$5.00
Tuition, A. B., Ph. B. and B. S. courses, per term	30.00
Tuition, engineering courses, per term	50.00
Graduate courses in engineering, per term	50.00
Room rent in dormitories, per year	$60 to 75.00
Incidental fee, for maintenance of grounds and public rooms, use of library, gymnasium, etc., per term	8.00
Graduation fee, including diploma	15.00
Chemical laboratory fees:	
Required course, No. 1 or No. 1a, per term	8.00
Required course, No. 2, in civil, sanitary and electrical engineering, junior year	15.00
Required course, No. 5, in sanitary engineering, senior year	15.00
Elective courses, No. 2, No. 3 or No. 4, per term	15.00
E. E. laboratory fee, per term	$2.00 to 10.00
Biological laboratory fees:	
Required course, No. 1, per term	2.00
Required course, No. 5, per term	3.00
Elective courses, No. 2 or No. 3, per term	6.00
Physical laboratory fees:	
Required course, No. 2, per term	4.00
Elective course, No. 1a, per term	5.00
Conditions examination fee	2.00
Fee for certificate of work done	2.00
Fee for certificate of graduation	1.00
Master's degree, registration and diploma	20.00

The tuition fees named will be in force for classes entering in and after 1911. For classes which entered before that year the rates of $25 and $40 will be continued. In the course leading to the degree of Doctor of Philosophy the maximum payment will be $300 if the degree be earned in five years.

Students who take part of their senior year's work at the Albany Medical College as provided on page 31, are charged $125 for the year's tuition, $50 to be paid to the treasurer of Union College and $75 to the treasurer of the Albany Medical College.

Tuition and other fees are due on the first day of each term.

Students must conform to the rules of the treasurer's office regarding registration at the opening of each term, and will not be admitted to any classes or laboratories until the required fees are paid.

No deductions are made because of absence from college.

No part of a term bill will be refunded for any cause.

Damage done by students to college property will be charged to their account.

No degree, certificate or dismissal will be given to any student until his bills are paid.

Board can be procured for $3.50 to $5 a week.

It is the custom of the student body to levy an annual campus tax of eleven dollars, five dollars of which is payable at the beginning of the fall term, three dollars at the beginning of the winter term, and three dollars at the beginning of the spring term. This money is used for the support of the different branches of athletics, consisting at present of foot ball, base ball, basket ball and track.

College Rooms

The college has two steam heated dormitories, accommodating one hundred students. Most of the rooms are arranged in suites of two, and all are unfurnished; they are rented at prices varying from $60.00 to $75.00 per year for each student occupying a room. The rooms are cared for by competent persons, employed and paid by the college. No room is secured until a lease is signed and filed in the college office. A student must occupy the room for which he signs, as transfers are not allowed. Each occupant of a college room will be held responsible for any damage done to the room. Students about to enter

college who wish rooms in the dormitories should make early application to the assistant treasurer. On application, a list of rooms, giving location and price, will be furnished. It is very desirable that students about to enter college should secure their own room-mates before the college year opens. When this is not done the men will be located in the order of application. At the end of the college year students giving up their rooms for any reason whatsoever must remove all furniture and property from their rooms not later than the Saturday following commencement day, as after this time the dormitories will be closed until the Saturday before the first registration day of the fall term. The dormitories will also be closed during the Christmas recess.

Students leaving property in their rooms during the vacations do so at their own risk.

Employment Committee

A committee of the faculty has been appointed to give assistance to students who desire employment for the purpose of meeting the expenses of a college education. It has been found that many opportunities for work exist in Schenectady by which students may earn from $2 to $4 per week, during term-time, without seriously interfering with their college studies. A considerable number of students meet the expense of board by acting as waiters in the various restaurants and boarding houses in the city. Others find employment as clerks in stores on Friday evenings and Saturdays; others in caring for furnaces and in other work about private residences. Applications for the assistance of the committee may be addressed to the chairman, Prof. James H. Stoller.

SCHOLARSHIPS

Funds given especially for this purpose enable the college to offer aid to a number of students each year, as follows:

General Scholarships

Available for students in the A. B., Ph. B. and B. S. courses.

Scholarships covering a part or the whole of tuition charges are granted to students upon the following conditions:

1. The declaration of a purpose to remain in Union College until graduation.

2. An acknowledgment that the aid received is regarded as a debt of honor, to be paid as soon as possible after leaving college.

3. The presentation of satisfactory evidence of financial need.

Scholarship aid will be withdrawn temporarily upon the failure of the student to be sustained in any subject, or upon his failure to maintain an average grade of eighty per cent. in the studies of any term, and after it has been withdrawn for three successive terms it will not be renewed.

Any serious breach of college discipline, evidence of moral delinquency, or repeated unnecessary expenditures will also result in the withdrawal of scholarship aid.

Credentials necessary for admission to another college will not be given to any scholarship student until he has repaid to the college treasury the full amount of scholarship aid received.

Application blanks will be provided by the president or by the dean upon request.

John David Wolfe Memorial Scholarships

The income of a fund of fifty thousand dollars established by the generosity of Miss Catharine Lorillard Wolfe is designed to aid students from the southern states.

These scholarships are available for students in all courses and are governed by the conditions named above.

Application blanks will be provided by the president or by the dean upon request.

Levi Parsons Scholarships

A generous benefaction by the late Hon. Levi Parsons, of Gloversville, N. Y., maintains several scholarships in each class, yielding at least one hundred and fifty dollars a year, each.

All scholarships begin at the rate of one hundred and fifty dollars a year. After the first term the value of the scholarship depends upon the standing of the student.

Scholarships of $300 a year are granted to students who have had, in the preceding term an average grade of 80 per cent. of more.

Scholarships of $200 a year are granted to students who have had, in the preceding term, an average grade of 80 per cent· or more.

Scholarships of $150 a year are continued to students who have had, in the preceding term, an average grade of 80 per cent. or more.

Among applicants, preference is given:

First, to blood relatives of the founder, bearing his name and living in the county of Fulton, Montgomery or Hamilton, in the state of New York, and especially to those bearing his name and living in Gloversville or Johnstown, Fulton County.

Second, to applicants living in the following places, according to the following order:

1. The city of Gloversville, Fulton County.
2. The city of Johnstown.
3. The township of Johnstown.
4. The county of Fulton.
5. The adjoining counties of Montgomery and Hamilton.
6. To blood relatives living in any other part of the United States.

Nomination to scholarships is made by the board of directors of the Gloversville Free Library; and the nominees must pass satisfactory examinations at the college· Applications are received by the directors of the Gloversville Free Library, Gloversville,

The continuance of these scholarships is subject to the rules, stated on page 134 concerning the withdrawal of the general scholarships of the college.

Thomas Armstrong Scholarships

The late Thomas Armstrong of Plattsburg, N. Y., provided for the grant of scholarships to residents of Clinton County, sons of practical farmers.

Nominations to these scholarships are made by the board of supervisors of Clinton County, and the yearly value of each scholarship is not to exceed two hundred dollars.

R. C. Alexander Prize Scholarship

The sum of four thousand dollars has been given in memory of the late Robert Carter Alexander, of the class of 1880, and a life trustee of the College, to be devoted to the establishment of a scholarship for the encouragement of classical studies.

The income of this found, amounting to two hundred dollars per year, will be awarded as a prize scholarship, upon the following conditions:

1. Candidates must be students in the classical course, and of approved moral character.

2. They must be free from conditions and must have obtained an average of at least eighty per cent. in the studies of the first two terms of the freshman year.

3. They must pass successfully a special examination at the close of the freshman year in each of the following subjects: Latin, Greek, Mathematics, English composition, and either French or German. These examinations will be based upon the work of the freshman year.

4. The award will be made to the candidate obtaining the highest general average in these examinations and in all the previous work of his college course.*

5. The prize scholarship will be forfeited upon evidence of moral delinquency, or upon failure to maintain an average grade of ninety per cent. in the work of any subsequent term. The scholarship, once lost, cannot be regained, but will be awarded, upon the above conditions, to a student in the next entering class.

*This cholarship is now held by Chauncey Holmes Winters, of the class of 1912.

6. All questions pertaining to the administration of this scholarship will be determined by a committee composed of the president of the college, the chairman of the scholarship committee of the faculty, and a member of the board of trustees.

Horace B. Silliman Scholarship

Three scholarships have been founded by the Hon. Horace B. Silliman, class of 46, giving to each recipient the income from two thousand dollars ($2,000) annually.

These scholarships are to be awarded to active members of the college Young Men's Christian Association by a committee composed of the president, the dean, and the president of the Young Men's Christian Association, under such rules and conditions as shall be determined by such committee, preference being given to students in the classical course.

The award is made to one student annually at the close of the freshman year.

Daniel F. Pullman Scholarship

The late Daniel F. Pullman, of Knox, Albany County, New York, provided in his will for the establishment of a scholarship of the value of $120 a year, to be given to a student in the classical course.

The award is made by the faculty, and in accordance with the terms of the will preference is given to members of the Methodist Episcopal Church.

Class of 1895 Scholarship

A fund has been given by the class of 1895 which provides for the grant of a scholarship of a yearly value not to exceed one hundred dollars.

The award is made by the faculty and, in accordance with the wish of the donors, preference will be given to descendants of members of the class.

Application for appointment to this scholarship must be made annually before September 1.

The conditions with respect to college standing governing the award of the general scholarships of the college apply to this scholarship also.

Daniel Vedder Scholarship

By the will of the late Daniel Vedder, of Schenectady, a scholarship has been established, of the annual value of two hundred dollars.

The scholarship is awarded by the faculty, and is given to a student who is preparing to enter the Christian ministry.

The holder must maintain an average standing of ninety per cent., and must pledge himself to abstain from the use of intoxicating liquors and tobacco.

If none of the candidates meets in every respect the conditions stated in the will of the donor, the scholarship will be awarded in such a way as to carry out as fully as possible the wishes of the founder.

The award is made at the end of the freshman year.

Law School Scholarships

Applicants for these scholarships, described below, must register at the college office by May 1st of Senior year.

John K. Porter Memorial Scholarship

A fund given by Mrs. K. Porter, in memory of her husband, is designed to assist students who, after graduating from college, pursue the study of law. The fund provides, at present, for three scholarships of ninety dollars each. The awards are made at commencement to seniors chosen by the faculty.

Gilbert M. Speir Memorial Scholarship

A fund given by Mrs. John K. Porter, in memory of her father, the late Judge Gilbert M. Speir, provides another scholarship for students of law who go from Union College to the Albany Law School, another department of Union University.

The sum of ninety dollars will be awarded at commencement to the senior chosen by the faculty, the choice being made on the basis of excellence in historical studies.

PRIZES

The following prizes are awarded from funds given especially for this purpose.

Blatchford Oratorical Medals

The Hon. Richard M. Blatchford, LL. D., of New York city, founded oratorical prizes, consisting of two gold medals of the value of the interest on $1,000, which are given to the two members of the graduating class who deliver at commencement the best orations, "regard being had alike to their elevated and classical character and to their graceful and effective delivery." These medals are awarded by a committee appointed by the trustees, and are presented at the close of the exercises.

Warner Prize

The Hon. Horato G. Warner, LL. D., of Rochester, N. Y., founded an annual prize, consisting of silver plate of the value of $28 to be presented at Commencement to the "graduate of Union College, classical or Latin-scientific course, who shall reach the highest standing in the performance of collegiate duties, and also sustain the best character for moral rectitude and deportment, without regard to religious practice or profession." The prize is awarded by the faculty.

Ingham Prize

The Hon. Albert C. Ingham, LL. D., of Meridian, N. Y., founded an annual prize of the interest of $1,000 (in the form of plate, or medal, or money, or both medal and money, as preferred), to be awarded at Commencement to that senior connected with the college for not less than two years who shall offer the best essay on one of two assigned subjects in English literature or history.

The essay must be typewritten, and must contain not less than 4,000 nor more than 4,500 words. Its signature (fictitious) and the writer's real name must be enclosed in a sealed envelope;

the signature and the name of the prize being given on the outside. The essay, with the note, must be presented by noon on the fifteenth day of May.

Allen Essay Prizes

The Hon. William F. Allen, LL. D., of Oswego, N. Y., established a fund of $1,000, the interest of which is devoted to prizes for the best three essays on any subject, submitted by members of the senior class.

The essay must be typewritten, and must contain not less than 2,500 nor more than 3,000 words, and must be signed and presented (with note, as in the case of the Ingham essay) by noon on May 15th. The prizes are awarded at Commencement.

Oratorical Prizes

Prizes are presented at Commencement to the two juniors and the two sophomores who deliver the orations best in composition and delivery on the occasion of prize speaking in Commencement week. Four juniors and four sophomores are selected for this competition by a committee of the faculty on the fifteenth of April. Candidates must be in full standing on appearance before the committee.

Allison-Foote Prizes

Founded by George F. Allison of New York city, and Wallace T. Foote, of Port Henry, N. Y., for the encouragement of debate in the literary societies. The prize consists of $100 in cash, and is to be awarded as the result of a public competition between representatives of the Adelphic and Philomathean Literary Societies. Fifty dollars will be awarded to the society presenting the strongest argument. The remaining $50 will be awarded to the debater who makes the best single speech, regardless of his society relations. Contestants must have engaged in at least ten debates in their respective societies during the college year immediately preceding. All further details are to be left to the determination of a committee, consisting of the president, the dean of the college, and the professor of Rhetoric.

Daggett Prize

In 1899 Miss E. Josephine Daggett bequeathed to Union College the sum of $1,000, the interest of which is devoted to a prize for conduct and character, without respect to scholarship, to be given at Commencement to a senior who shall have passed through a full course of four years at the college.

Pullman Prize

Mr. Daniel F. Pullman, of Knox, Albany County, New York, has bequeathed to Union College the sum of $2,000 to found two annual prizes.

The Pullman Classical Prize of $40, is given to that member of the graduating class who, in an attendance of three years has attained the highest standing in scholarship in the classical course.

The Pullman Engineering Prize, of $40, is given to that member of the graduating class who has taken the full course in the engineering department, and who shall have attained the highest standing in that course.

In awarding both prizes, preference is given to members of the Methodist Episcopal Church.

DEGREES AND HONORS

The candidate for a degree must have paid all dues to the college treasurer, and returned all books borrowed from the college library; he must also attend the conferring of degrees, or be expressly excused therefrom. The candidate for a bachelors degree must have entered college before the end of the first senior term.

Degrees for Resident Study

The degrees of the college are conferred by authority of the board of trustees upon candidates who have successfully completed courses of resident study, as follows:

The Bachelor's Degree

The degree of Bachelor of Arts will be conferred upon candidates who have successfully completed Course 1, page 30, the degree of Bachelor of Philosophy, upon those who have successfully completed Course 2, page 30; the degree of Bachelor of Science, upon those who have successfully completed Course 3, page 30; the degree of Bachelor of Engineering, upon those who have successfully completed Course 4, first, third or fourth division, pages 30, 31; the degrees of Bachelor of Engineering and Bachelor of Philosophy, upon those who have successfully completed Course 4, second division, page 31.

The Master's Degree

The degree of Master of Civil Engineering will be conferred upon candidates who have successfully completed Course 5, first division, page 31; the degree of Master of Electrical Engineering, upon those who have successfully completed Course 5, second division, page 31.

The Doctor's Degree

The degree of Doctor of Philosophy will be conferred upon students of electrical science who fulfill the requirements stated on page 118.

Degrees for Non-Resident Study

The degree of Master of Arts or of Master of Science will be given to graduates of Union College who have been registered as candidates for the degree not less than two years, have completed definite courses of advanced study in two departments, and have submitted a satisfactory thesis and passed satisfactory examinations. The total amount of work done is intended to be the equivalent of one year of resident study.

A year of resident study in any non-professional graduate school, approved at the time of registration by the two departments concerned, will be accepted instead of the two years' study above mentioned on fulfillment of the same conditions regarding thesis and examinations.

Each candidate for this degree must register his name, address, and the two departments chosen, with the dean of the college not later than the fifteenth of October of the year for which he desires registration.

The thesis must be presented to the dean by May 1st for submission to the faculty in time to provide for all necessary examinations before commencement.

A fee of $20 is charged, which covers examinations and diploma; of this amount $10 is payable at the time of registration and $10 at the time of the final examinations.

Honors

All commencement prizes are limited to A. B., Ph. B., or B. S. students who have entered at or before the beginning of the senior year, and who are in full standing at the close of the second term; and to engineering students entered likewise and in full standing at the close of the second term, in both the engineering course and the English department of the B. S. or Ph. B. course.

Commencement Appointments

These honors are assigned to ten seniors on the basis of scholarship, as stated under Standing, page 128. Provisional appointments are made at the close of the second term senior,

and become final if those who receive them retain the same relative rank to the end of their course. Under present regulations, no other person can become competitors for the Blatchford Oratorical Medals.

Seniors not in full standing at the close of the second term are ineligible to a Commencement appointment.

Students who receive commencement appointments as the result of the third term's work are excused from speaking unless the faculty direct otherwise.

The Valedictory

This honor is awarded to the senior of highest standing among the ten receiving Commencement appointments.

Special Honors

Special honors are also given at graduation in each of the following subjects: Greek, Latin, English language, English literature, French, German, mathematics, physics, chemistry, biology, economics, history, sociology and philosophy. The work required in each case will be equivalent of three terms of classroom work of two hours per week each, and will be outside of the prescribed or elective courses. The candidate for special honors must apply to the head of the department in which he proposes to take honors not later than the first Monday of the spring term of the junior year. He must have attained in all the studies of the department in which he tries for honors a rank of not less than ninety per cent. of the maximum. The evidence that he has successfully completed the extra course prescribed for him must be submitted not later than June 1st of the senior year to the faculty, who shall decide in each case whether the work done is worthy of an honor. The honors attained are stated in the diploma, and the names of the students who take honors are printed one Commencement programme.

Phi Beta Kappa Society

At the end of the third term of the senior year, one-third of the members of the graduating class in the classical course, candidates for the degree of Bachelor of Arts, may be elected to

membership in the Phi Beta Kappa Society. The election is based upon scholarship and character and is given as a rule, to the men who stand highest in scholarship in their class.

The Alpha of New York chapter was established in 1817; and ever since that time election to the society has been one of the highest distinctions to be gained by scholarship.

Sigma Xi

Election to the honorary scientific society of Sigma XI, is one of the honors open to seniors of marked ability in the scientific and engineering departments. Membership is confined to the faculty, senior candidates for graduation, and alumni. The election occurs during the latter part of the senior year and selections are made on the basis of high general scientific or engineering ability and particularly as a mark of promise of ability in research and independent work.

The society was founded at Cornell University in 1886 and has chapters at more than twenty of the leading colleges and universities of the country. The Union chapter was established in 1887, since which time about one hundred members have been elected by this chapter.

DEGREES CONFERRED

AT THE

ONE HUNDRED AND FOURTEENTH ANNUAL COMMENCEMENT

JUNE 8, 1910

Honorary

LL. D.

Count Johann Heinrich von Bernstorff ..... Germany

D. D.

Charles Temple ..... Ogdensburgh
William A. Waddell ..... Lencoes, Brazil
Hervey DeWitt Griswold ..... Lahore, India

Sc. D.

William L. R. Emmet ..... Schenectady

L. H. D.

Daniel Sylvester Tuttle ..... St. Louis, Mo.

In Course

A. M.

Leslie Natham Broughton ..... Ithaca

M. S.

Raymond S. Bennett ..... Schenevus

M. C. E.

John Albert Charlton Callan ..... Schenectady
Oscar Frederick von Voigtlander ..... Schenectady

M. E. E.

James Hannah Cunningham ..... Schenectady
George William Roosa ..... Buffalo

B. S.

Charles Lawrence Mead ..... Saulte Ste. Marie, Mich.
(as of the class of 1909)

B. E.

Ernest J. Fuller ..... Boston, Mass.
Raymond Shelley ..... Albany
(as of the class of 1908)

Leo H. Perry ..... Herkimer
Harry A. Schaupp ..... Schenectady
(as of the class of 1909)

Class of 1910

A. B.

Samuel McCrea Cavert ..... Charlton
Arthur Russel Chaffee ..... Morristown
Roscoe Almond Paul ..... Athens
Philip Foster Shutler ..... Utica
Harry G. Van Deusen ..... Cooperstown
Theodore Demarest Walser ..... Cohoes

Ph. B.

Roland Miller Bartlett ..... Glendale, Mass.
William Lane Cavert ..... Charlton
Johnson Potter Hallenbeck ..... Hoffmans
Edward B. Irish ..... Schenectady

B. S.

William Alfred Ackroyd ..... Albany
Albert Edward Carmichael ..... Schenectady
Harry Gabriel Coplon ..... Troy
William Ferguson ..... Oneida
James Mason Hotchkiss ..... Schenectady
Horace King Hutchens ..... Pulaski
William Herman Ladue ..... Plattsburg
Howard C. Macomber ..... Delanson
Arthur Cuthbert Potter ..... Omaha, Neb.

Henry Prosper Stewart ....Bath
Horace Eggleston Vedder.....Pasadena, Cal.

B. E.

William Joseph Anderson .....Glens Falls
Walter J. Becker .....Altamont
Raymond S. Bennett .....Schenevus
Thomas Bernard Bergan.....Auburn
John Hammond Bovier .....Elmira
John Gideon Charest .....Schenectady
Archibald Reid Dennis.....Kalamazoo, Mich.
George Adolph Dillinger .....Nuernberg, Germany
Harley Dunbar .....Gloversville
Harlan Haviland Grover .....Glens Falls
Adam John Horn .....St. Johnsville
Stephen Dunn Kelley .....Saratoga Springs
Arnold Edward Kriegsmann .....Schenectady
John J. McManus .....Albany
William Baucus Neilson, Jr. .....Mechanicville
William Edward Paul .....Athens
Edward Delavan Ransom .....Albany
Harold E. Scheper.....Beaufort, S. C.
Harold E. Seamans .....Marathon
Richard Parson Sears .....Buffalo
Raymond Seem .....Elmira
Aaron H Sherman .....Albany
Philip Foster Shutler .....Utica
N. Waldron Slutter .....Lackawanna
Carson Edwards Smith .....Herkimer
Burr Manlow Stark .....Broadalbin
Paulo Floriano de Toledo .....Sao Paulo, Brazil
Edmund Brown Whitcomb .....Holyoke
Peter J. Whitmore .....West Coxsackie
William DeWitt Zielley .....Avoca
Judson Zimmer .....Gloversville

AWARDS

Valedictory

Samuel McCrea Cavert ..... Charlton

Commencement Orations

Roland M. Bartlett ..... Glendale, Mass.
William L. Cavert ..... Charlton
Howard C. Macomber ..... Delanson
Roscoe A. Paul ..... Athens
Samuel M. Cavert ..... Charlton

Engineering Theses

Raymond S. Bennett ..... Schenevus
Adam J. Horn ..... St. Johnsville
Walter J. Becker ..... Altamont
Harlan H. Grover ..... Glens Falls
Peter J. Whitmore ..... West Coxsackie

Special Honors

In English ..... Edward B. Irish
In History ..... Albert E. Carmichael
In Mathematics ..... Roland M. Bartlett
In Philosophy ..... Samuel M. Cavert

Warner Prize

Roland M. Bartlett

Ingham Prize

Arthur R. Chaffee

Allen Prizes

1st. Theodore D. Walser
2nd. Harry G. Coplon
3rd. Edward B. Irish

Extemporaneous Debate Prizes

Roland M. Bartlett
Class of 1910

Harry A. Gordon
Class of 1911

Prize for Oratory

Juniors

Otto A. Faust
Manly L. Mackey

Sophomores

James H. Potter
Kenneth E. Walser

Allison-Foote Prizes

Won by the Philomathean Society
and
Samuel M. Cavert

Blatchford Oratorical Medals

1st. Samuel M. Cavert
2nd. Howard C. Macomber

Daggett Prize

Samuel McCrea Cavert

Pullman Prizes

Samuel M. Cavert
Walter J. Becker

John K. Porter Memorial Scholarship

Harry G. Coplon
Horace E. Vedder

Gilbert M. Speir Memorial Scholarship

Albert E. Carmichael

Horace B. Silliman Scholarship

David R. Finley

Phi Beta Kappa

Samuel M. Cavert
Roscoe A. Paul

Sigma Xi

Roland M. Bartlett
Raymond S. Bennett
John H. Bovier
Adam J. Horn
Philip F. Shutler
Walter J. Becker
William E. Paul
Peter J. Whitmore

ALBANY MEDICAL COLLEGE

The Medical College building, situated on Eagle street, Albany, is well appointed in its lecture rooms, laboratories, dissecting room and museums. The laboratories in chemistry and physiological chemistry are fitted with every requisite for the use of the classes and the illustration of the lectures, while the Bender Hygienic Laboratory furnishes unexcelled facilities for instruction in histology, pathology, bacteriology, experimental physiology and clinical microscopy.

The location of the college is such as to afford superior advantages to the student. The hospitals and dispensaries furnish an abundant supply of material for the illustration of clinical medicine and surgery, while the museums are especially rich in anatomical and pathological preparations.

The course of instruction is graded and extends over four years. The curriculum embraces lectures by professors and lecturers; recitations conducted mainly by instructors, and practical demonstrations, clinical teaching and laboratory work, in which the professors in the different departments are assisted by clinical assistants and demonstrators.

The Albany Hospital, St. Peter's Hospital, Child's Hospital, St. Margaret's House, Albany's Hospital for Incurables, County Hospital, South End Dispensary, Eye and Ear Infirmary, Albany Orphan Asylum and dispensaries connected with each are, by the regulation of their governing boards, made available for clinical purposes to the students, and appointments to positions on the house staffs of the Albany Hospital, and other hospitals in Albany and neighboring places, are annually made and are competed for by the members of the graduating class.

TRUSTEES

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Vice-President
ALDEN CHESTER

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CALENDAR 1910-1911

1910

Regular winter session begins .....Tuesday, September 20
Thanksgiving vacation begins.....Wednesday, November 23
Lectures resumed .....Monday, November 28
Christmas vacation begins.....Saturday, December 24

1911

Lectures resumed .....Wednesday, January 4
Commencement .....Tuesday, May 16

ADMISSION

All matriculates must secure 60 academic counts or their full equivalent, before beginning the first annual course counted toward the degree unless admitted conditionally, in which case the deficiency is not to exceed 15 academic counts and must be made up before the student begins the second annual course counted toward the degree.

When all requirements are fulfilled, the regents issue a medical

student certificate which the candidate must file with the registrar of the college.

Preliminary Examination.—The preliminary examination of medical students is under the control of the Board of Regents of the University of the State of New York. Those contemplating the study of medicine should apply to the Examinations Division, University of the State of New York, Albany, by letter or otherwise, if information concerning this examination further than that given in the catalogue of the Medical College is desired. One of the examinations will be held in Albany, January 16-20, 1911.

Mid-Winter Written Examinations in all the departments are held before the Christmas vacation. A printed schedule of these examinations is furnished the class.

COURSE OF INSTRUCTION

The four-year graded course required of all candidates for the degree of Doctor of Medicine embraces the following subjects:

First Year

1. **Anatomy.** Three lectures; six hours osteology and dissection.
2. **Inorganic Chemistry.** Two and a half lectures; four hours laboratory; one recitation.
3. **Organic Chemistry.** Two lectures; one recitation.
4. **Physiology.** Two lectures; one recitation; two and a half hours laboratory and demonstration.
5. **Histology.** Five hours laboratory; one recitation.
6. **Materia Medica.** Three lectures; two recitations.

Lectures 12½; laboratory 9 hours; dissection and demonstration 8½ hours; recitations 6.

Second Year

1. **Anatomy.** Two lectures; seven hours dissection and demonstration; two recitations.
2. **Anatomy and Pathology of Nervous System.** One lecture; two and a half hours laboratory.
3. **Organic and Physiological Chemistry and Toxicology.** One and a half lectures; three hours laboratory; one-half recitation.

4. **Physiology.** One lecture; two and a half hours laboratory; one and a half recitations.

5. **Therapeutics.** One lecture; one-half recitation.

6. **Theory and Practice.** Two lectures; one-half recitation.

7. **Hygiene.** One lecture.

8. **Surgery (including Pathology).** Two and a half hours laboratory; two demonstrations.

9. **Bacteriology and Pathology.** Eight hours laboratory.

10. **Physical Diagnosis.** One demonstration half the term.

11. **Pharmacology.** One demonstration half the term.

Lectures 9½; dissections and demonstrations 10 hours; laboratory 18½ hours; recitations 5.

Third Year

1. **Theory and Practice.** Four lectures; two recitations; one hour clinics.

2. **Clinical Microscopy.** Two and a half hours laboratory.

3. **Therapeutics.** Two lectures; one recitation.

4. **Electro-therapeutics.** One lecture half the term.

5. **Obstetrics and Gynecology.** Three lectures.

6. **Pediatrics.** One lecture; one recitation half the term.

7. **Neurology.** One lecture; one recitation; one clinic.

8. **Surgery (including operative, fractures, dislocations).** Five lectures; two recitations; three hours clinics.

9. **Physical Diagnosis and Ophthalmology.** Section work two hours.

10. **Medical Jurisprudence.** One lecture half the term.

11. **X Rays.** One demonstration half the term.

12. **Obstetrical Histology and Pathology.** Two and a half hours laboratory.

13. **History of Medicine.** One lecture half the term.

Lectures 17½; laboratory 5 hours; demonstrations ½ hour; recitations 6; section work 2; clinics 5.

Fourth Year

1. **Theory and Practice.** Three lectures; one recitation; two and a half hours clinics.

2. **Neurology.** One lecture; one clinic.

3. **Gynecology.** One lecture half the term.

4. **Obstetrics.** Two and a half lectures.

5. **Surgery (including Orthopedics).** Four lectures; one recitation; three hours clinics.

6. **Specialties.** One recitation.

7. **Conferences.** One medical; one surgical.

8. **Clinical section work.** Sixteen hours.

Lectures 11; recitations 3; conferences 2; clinics 6½; clinical section work 14 hours.

The order of instruction for the ensuing session will be found in the catalogue of the Medical College, and may be obtained by application of the Registrar.

Laboratories

Practical Chemistry. The chemical laboratory is well furnished, conveniently arranged and supplied with all necessary apparatus. The laboratory course is preceded, since although some knowledge of chemistry is highly desirable none is now required at entrance, by a series of lessons upon chemical nomenclature, notation and the essential principles of theoretical chemistry, including the laws of combination and valence, and these subjects are therefore more briefly treated in the regular lecture course. The practical laboratory work includes tests for those metals and acids, which, in combination, are important as constituents of medicinal compounds or as poisons, together with the separation of the chief groups, volumetric analysis, the examination of unknown substances and toxicology. All chemical reactions are written upon the blackboards, discussed by the class, and entered upon their notes.

Physiological Chemistry. Laboratory work in this subject consists in the isolation, preparation and identification by tests, of the various important proteins, fats and carbohydrates. The composition of the tissues and organs is next studied with special reference to their most important constituents; the chemistry of digestion, secretion and excretion then receives attention in relation to the several physiological process involved. Finally there follows a thorough course in qualitative and quantitative urine analysis. The student is required to make careful and thorough notes of the actual experiments performed and also of

the deductions to be drawn from them. The practical work is interspersed with lectures and recitations.

Histology, Pathology, Bacteriology and Clinical Microscopy

Work in these departments is carried on in the Bender Hygienic Laboratory, on Lake avenue, near the Albany Hospital.

This building was erected by the late Matthew W. Bender, of Albany, and is thoroughly equipped with the apparatus necessary for the study of histology, pathology, bacteriology and clinical microscopy. Practical work in these branches is obligatory upon all students, and abundant opportunity is furnished in the laboratory for acquiring a thorough knowledge of these important subjects. An electric lantern which is adapted to the projection of pictures and microscopic preparations as well as lantern slides is used to supplement the more practical methods of demonstration.

Histology. The work consists of explanatory talks covering the subject of the day's study, followed by practical exercises in the laboratory.

Bacteriology. The work consists of lectures followed by practical laboratory exercises. It is intended to render the student familiar with the underlying principles of bacteriology and their application to clinical medicine and surgery.

Pathology. The work consists of a short lecture on the subject under discussion for the day followed by practical exercises in pathological anatomy and histology. Besides this the students are instructed in the technique of making autopsies, and material from autopsies and surgical operations is demonstrated to them as available. Demonstrations in experimental pathology are introduced whenever possible.

Clinical Microscopy. The course consists of preliminary talks followed by practical work in the examination of blood, urine, sputum, fœces, stomach contents, exudates, etc.; and includes a short course in clinical bacteriology.

In all these courses the student is taught independent methods

of work and is required to keep a permanent record, illustrated by drawings, of all laboratory exercises.

A limited number of students who have shown proper aptitude are offered the opportunity to work along more advanced lines.

For the alumni of this school, and for physicians in the vicinity, this laboratory offers excellent facilities for the examination of urine, sputum, pathological specimens and blood. Information regarding such examinations may be obtained by communicating with Dr. Thomas Ordway, Director.

Practical Clinical Courses

In order to familiarize students with the practical work of their profession, and to bring them into closer personal contact with patients, the fourth year class is divided into sections of eight or ten men, and on four days in each week each man devotes several hours to the examination and personal observation, under the supervision of the instructors, of patients in the wards and out-patient departments of the various hospitals and dispensaries. In this clinical work special attention is devoted to the complete examination of the blood, urine, sputum and stomach contents, as well as to the special examination of the eye, ear and other organs. Thus in the course of the school year the men in each section acquire practical knowledge and technical diagnostic dexterity in general medicine, general surgery, dermatology, nerology, insanity, otology, laryngology, ophthalmology, rhinology, diseases of children and infants, infant feeding, diseases of the rectum and genito-urinary tract, operative surgery, orthopedic surgery, operative obstetrics, electro-therapeutics and medical technic.

FEES AND EXPENSES

Fees, excepting the final examination fee, are payable each year in advance, are not returnable, and are as follows:

First Year

Marticulation	$5 00	
Lecture Course	100 00	
Chemical Laboratory	10 00	
Histological Laboratory	10 00	
Dissection (including material)	5 00	
		$130 00

Second Year

Matriculation	$5 00	
Lecture Course	100 00	
Dissection (including material)	10 00	
Bacteriological and Pathological Laboratory	15 00	
Physiological Chemistry and Experimental Pathology	15 00	
		$145 00

Third Year

Matriculation	$5 00	
Lecture Course	100 00	
Clinical Microscopy, Surgical and Obstetrical Pathology	15 00	
		$120 00

Fourth Year

Matriculation	$5 00	
Lecture Course	100 00	
Final examination	25 00	
		$130 00

In addition to the fees above stated, an annual charge of two dollars is made to members of the first, second and third year classes taking laboratory courses at the Bender Laboratory, for the use of microscopes and other apparatus. This fee is paid to the director at the laboratory, and after laboratory tickets have been issued by the registrar. For the laboratory work in physiological chemistry there is a fee of two dollars to cover use of apparatus and breakage payable to the director at the beginning of the session. There is also a fee of five dollars paid by members of the fourth year class to the Guild for the Care of the Sick for the course in practical obstetrics.

The payment of three hundred dollars in advance entitles to attendance upon four courses of lectures, exclusive of laboratory and other special fees above stated, and effects a saving of one hundred dollars on the cost of the four years course, *but this ticket must be taken out within thirty days fram date of matriculation, and notice is hereby given that its sale will be discontinued after the session of* 1910-11. All other fees are payable strictly in advance except that the final examination fee may be paid at any time before the examination begin. Graduates of the

school may attend lectures and stated clinics without charge except for matriculation in case of prolonged attendance.

The cost of living in Albany is less than in most other cities of its size. The janitor of the college keeps a list of boarding houses at which good rooms and board can be obtained at from four to five dollars a week or upwards, and by clubbing together students can live comfortably at still lower rates. No estimate can well be made of cost of text-books and other personal expenses since these of necessity vary greatly in different cases.

REQUIREMENTS FOR GRADUATION

The candidate must be twenty-one years of age, and exhibit a certificate from a physician or surgeon, duly authorized by law to practice his profession, that he has studied medicine and surgery under his instruction during the period required by law in this state, and he must present evidence of having complied with the law concerning preliminary examination.

He must have attended not less than four regular courses of lectures of which the last shall have been at this college.

Students who have attended one or more courses of lectures at other recognized medical colleges may be admitted to advanced standing in this college if they submit proper evidence of such attendance and a precise statement of subjects included in "Examination Departments," as given in the Medical College Catalogue, in which satisfactory final examinations have been passed, and comply with the requirements stated under "Examination Rules." No credit will be given for work done elsewhere in the fourth year departments.

He must be of good moral character.

He must maintain a satisfactory standing during his course and pass a satisfactory final examination in the several branches taught.

Regular and punctual attendance is required, and matriculation tickets are endorsed with attendance at the end of the term.

For catalogues or further information, address

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ALBANY LAW SCHOOL

This school is among the oldest institutions of the kind in the country, having been established in 1851, and its graduates number many of the most successful men in the profession. The school is and has been largely represented in the executive, judicial and legislative departments of this and many other states, as well as of the federal government.

It became a part of Union University in 1873, and begins its sixty-first year as a law school with the present scholastic year. During its long and successful career it has, in common with other law schools, done much to demonstrate what was at one time doubtful, but is now accepted almost as an axiom, that a course at the law school is a well-nigh necessary prerequisite to a successful professional career. Its instructors have always been men of repute and standing, both for professional learning and personal character.

The local advantages of the city of Albany, as the seat of a professional school, can not be overrated. It is the capital of one of the leading states in the Union, whose legislature is in session here for the third part of the year, presenting opportunities not afforded by any other law school in the state for observing the methods and procedure collectively of the executive, judicial and legislative departments of the state government. The knowledge thus obtained by the students at law, who are to complete their course and to enter the realm of public affairs, can not be overestimated.

It is easily accessible, remarkably healthful, and the scene of great business and professional activity. It is large enough to afford its inhabitants all the means of culture and recreation naturally to be looked for in a city, while it not so large as to

make the cost of living burdensome, even to persons of extremely limited means.

The facilities afforded the students for reading and study are unsurpassed.

Besides the convenient and well chosen library of the school accessible to the students at all hours of the day and evening, the students have the privilege of using the state law library, the most extensive and best selected in the United States, consisting of 65,000 volumes or more.

With free access to these libraries the student may be relieved to a great extent from purchasing text-books.

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Special Lecturers. The list of special lecturers is a notable one, including the former chief judge and two associate judges of the Court of Appeals and a justice of the Supreme Court.

Hubbard Chair of Legal Ethics. The circulars of seventy of the leading law schools of the country show that only twenty of this number make the subject of legal ethics part of the curriculum. With two exceptions, those schools are either in the west or south. These facts led Gen. Thos. H. Hubbard, class of '60, to place at the disposal of the board of trustees the sum of $10,000, the income to be applied to lectures upon this subject. The board of trustees decided to inaugurate the course at the opening of the school year of 1903. General Hubbard, the founder of the chair, delivered the opening lecture, and will be followed during the academic year of 1910-11 by Judge William E. Werner of the Court of Appeals, Hon. Alton B. Parker, late chief justice of that court, and others.

CALENDAR

First Semester

1910

Registration of students ..... Tuesday, September 20
Scholastic year begins ..... Wednesday, September 21
Election day recess ..... Tuesday, November 8
Thanksgiving recess begins, noon ..... Wednesday, November 23
Lectures resumed ..... Tuesday, November 29
Holiday recess begins, noon ..... Friday, December 22

1911

Lectures resumed ..... Wednesday, January 4
McKinley day ..... Sunday, January 29
Examinations ..... Thursday-Friday, February 2-3

Second Semester

Registration, tuition due ..... Monday, February 6
Washington's birthday, recess ..... Wednesday, February 22
Good Friday, recess ..... Friday, April 14

Decoration day, recess .....Tuesday, May 30
Examinations .....Thursday-Friday, June 1-2
Commencement .....Thursday, June 8

ADMISSION AND GRADUATION

Admission to Junior class. The full course of study consists of two scholastic years, divided into two semesters each. Any student who has conformed to the requirements of the regents as to general education after commencing the study of law, may enter the junior class, and upon completion of the two years' course and passing the required examinations will be graduated with the degree of LL. B.

College graduates will find this course well adapted to the requirements of the court of appeals, requiring them to study law two calendar years after graduation. They can enter the school upon presentation of their certificate of graduation, without examination, attend the full course of two years, of not less than eight months each, receive the degree of LL. B., and take the bar examination in June following their graduation from the school.

Admission to Senior class. Any student not a college graduate who has completed two years of required legal study, after conforming to the requirements of the regents as to general education, or any college graduate who has completed one year of such study after graduation, will be admitted to the senior class without examination upon production of the regents' certificates and the certificate of the clerk of the court of appeals, and will be admitted to the privileges of the class, but will not be received as a candidate for a degree.

Students who have attended a law school and satisfactorily completed the work of the junior year will be allowed to enter as candidates for a degree in the discretion of the faculty.

Degree. The degree of LL. B., will be conferred only upon students who have completed the entire course of two years at a law school.

EXPENSES

The fees for tuition are payable in advance as follows: For the full course of one year, tuition, $110; matriculation fee, $10; fee for certificate of attendance, diploma and expenses attendant upon commencement, $10; or, $65 for the first semester and $65 for the second. For the full course of two years, upon confering degree of LL. B., tuition, $220; matriculation fee, $10; fee for certificate of attendance, diploma and expenses attendant upon commencement, $10; or, $65 for the first semester and $55 for each semester thereafter, except the last, which will be $65.

For catalogues or further information address

Jno. J. Hughes, *Secretary*
Albany Law School,
Albany, N. Y.

THE DUDLEY OBSERVATORY

The Dudley Observatory is located on Lake avenue, in the southwestern part of Albany, to which site it was removed in 1893 from its former location in the northern part of Albany. It is devoted to original researches in astronomy, according to the purpose of its founder and successive patrons. Its contributions to science are represented in two volumes of "Annals," and in other published volumes and memoirs contained in the transactions of learned societies and astronomical journals. Its principal line of work at the present time is the determination of problems relating to the positions and motions of the stars and of the solar system as a whole. The staff consists of the director, nine assistants and seven computers.

The instrumental equipment of the observatory is designed for the purposes of exact measurement in line with its chosen work. In the tower of the main building is the Pruyn equatorial, with object-glass twelve inches in diameter. This instrument is equipped both for visual and photographic use, and is of a high order of mechanical perfection. The Olcott meridian circle is located in a separate building, especially designed for securing the utmost equality in the temperature between the external air and that in the building itself. Its object-glass is eight inches in diameter. It was made by Pistor and Martins, of Berlin, and is regarded by astronomers as a masterpiece of accurate workmanship. This instrument has been employed for many years in obtaining the measurements necessary for the construction of the numerous and elaborate star catalogues which have issued from the Dudley Observatory. At present it is installed in a branch of the Dudley Observatory at San Luis, Argentina. A staff of seven persons is engaged in observations at that observatory.

These observations have been prosecuted with great energy and it is expected that the entire program will be completed in 1911.

In addition to these instruments, the observatory is in possession of various small telescopes, clocks, chronographs and smaller apparatus.

The institution is supported by an endowment, chiefly contributed by Mrs. Blandina Dudley, the late Catharine W. Bruce, and Hon. Frederic P. Olcott, as well as by appropriations which have been received from the National Academy of Sciences, and from current contributions of trustees and friends of the institution.

Since 1902, annual grants have been made to the director of the observatory by the Carnegie Institution of Washington. These have been sufficient to provide for the entire force of assistants and computers now employed. In 1905, the Carnegie Institution made special provision for carrying on the star researches upon which the observatory is engaged for a period of ten years. This includes an appropriation which enables the observatory to send the Olcott meridian circle to the southern hemisphere for several years with an ample force of observers, in order to carry out an essential feature of its investigations. The southern observatory is now in operation.

The Dudley Observatory is not designed to give general instruction in astronomy, though special students contemplating instruction in professional lines have been received from time to time under an arrangement of computing service to the observatory.

The observatory is opened to visitors on Tuesday evening of each week from 8 to 10 o'clock.

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ALBANY COLLEGE OF PHARMACY

The Albany College of Pharmacy was created by act of the board of governors of Union University, June 21, 1881, and constitutes the department of pharmacy of Union University. It was incorporated as the Albany College of Pharmacy, August 27, 1881. The college is centrally located at 43-45 Eagle street. The classes in chemistry are held in the lecture rooms and laboratories of the Albany Medical College.

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CALENDAR FOR 1910-1911

1910

Introductory lecture .....Monday, October 3
Christmas recess begins .....Friday, December 23

1911

Lectures resumed .....Wednesday, January 4
Commencement .....Tuesday, April 25

ADMISSION

All applicants for admission to regular standing in this college must be at least seventeen years of age and will be required to present a Pharmacy Student Certificate issued by the New York State Education Department. The requirement for this certificate is the completion of the first year's course in a recognized high school or academy, or evidence of an equivalent education. Inquiries concerning this preliminary requirement may be addressed to the New York State Education Department, Albany, N. Y.

THE CURRICULUM

The curriculum of the college embraces:

Chemistry—Theoretical, general, pharmaceutical and analytical
Botany—Structural, systematic and analytical
Materia Medica and Pharmacognosy
Pharmacy—Theoretical and Practical
Microscopy—Theoretical and practical in its relation to pharmacy
Toxicoloy
Pharmaceutical Mathematics
Physics
Physiology
Latin
Pharmaceutical Jurisprudence
Commercial Pharmacy

REQUIREMENTS FOR GRADUATION

The diploma of this college confers the degree of Graduate in Pharmacy (Ph. G.). Applicants for this degree must have had the required preliminary education, be of good moral character, have attended two full courses in this college, or the last course in this college and the first in some other registered college of pharmacy; have passed satisfactory examinations and paid all fees as hereafter stated.

FEES FOR TUITION

EACH YEAR

Matriculation	$5 00
Tuition	75 00

SITUATIONS

Students desirous of obtaining employment while attending college will be assisted as far as possible in securing situations, but employment cannot be promised in advance, and places cannot be secured by correspondence. During the past several years the faculty has had a much larger number of openings offered for graduates to lucrative positions than it has been able to fill. The demand on the part of the employers for skilled assistants is steadily increasing, and a college diploma or license from an examining board is demanded by law of those who engage in the practice of pharmacy in most of the states and cities of the Union.

For separate catalogue giving more complete information address

THEODORE J. BRADLEY, PH. G., *Secretary*
43-45 Eagle street
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ENROLLMENT, UNION UNIVERSITY, 1910-11

STUDENTS OF UNION COLLEGE

Abbreviations

c, A. B. course; *ls,* Ph. B. course; *s,* B. S. course; *e,* B. E. course in general engineering; *se,* B. E. course in sanitary engineering; *ee,* B. E. course in electrical engineering; *els,* B. E. general engineering and Ph. B. six year course; *m,* attending Albany Medical College; N. S., North Section; M. S., Middle Section; S. S., South Section; N. C., North College; S. C., South College.

An asterisk (*) before a student's name indicates that he has not been advanced in standing with his class.

Candidates for the Degree of Master of Arts

James Alexander Barkley.....*Lake George*
Henry Winne Bell, Ph. B. .....*Albany*
George M. Elmendorf, Ph B. .....*Herkimer*
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Lewis Stewart Parsons, A. B. .....*Liberty*
Charles N. Waldron, B. S. .....*Schenectady*
Mark S. Watson, A. B. .....*Chicago, Ill.*
James Bell Welles, A. B. .....*Morris*

Candidate for the Degree of Master of Science

Shiv Narayan, M. A., B. Sc. .....*India*

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Candidate for the degree of Doctor of Philosophy.

Olin J. Ferguson, M. E. E.....*Schenectady*..244 Parkwood Blvd
Candidate for the degree of Doctor of Philosophy.

Morland King, M. E. E. .....*Schenectady*..Union College
Candidate for the degree of Doctor of Philosophy.

R. Philip Clark, B. E. ....*Schenectady*..Phi Gamma Delta House
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Leland W. Irish, B. E.....*Northwestern Univ.* Evanston, Ill.
Candidate for the degree of Master of Civil Engineering.

Daniel A. Young, B. S. in C. E...*Schenectady* 320 Lenox Rd.
Candidate for the degree of Master of Civil Engineering.

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e Charles Helm.....*Saratoga Springs*.....Δ Φ House
e Bernard Herman .....*Newburgh*..... Scotia
s Don King Hutchens .....*Pulaski*.....Α Δ Φ House
Nugihalli Narasimha Iengar.....*India* .....25 Eagle St.

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e	Joseph Kirchenbaum	*Schenectady*	347 Maxon Road
s	Robert Francis La Barron	*Binghamton*	Δ Υ House
e	Richard Perkins Lent	*Highland*	Φ Δ Θ House
e	William Johnson Lewis	*Cohoes*	K A Lodge
*ls	Victor Alexander Lord	*Syracuse*	5 North Colonnade
e	Russell Edmund Lowe	*New York City*	A Δ Φ House
s	Edward Lawrence Mack	*Vergennes, Vt.*	Φ Δ Θ House
e	Charles Thomas Male	*Niskayuna*	Niskayuna
c	Hubert Mann	*Schenectady*	37 Glenwood Blvd
*s	Thomas Marion Marshall	*Yonkers*	K A Lodge
e	Charles F. Masterson	*Barton*	Ψ Υ House
ls	Stephen Lorenzo Mayham	*Schoharie*	Δ Φ House
e	Leland Rea McKnight	*Salem*	Pyramid Club
e	Joseph McMahon	*Elmira*	21 Park Place
c	Joseph Patrick Mohair	*Newton, N. J.*	Pyramid Club
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s	Robert Fortney Payne	*Schenectady*	864 Union St.
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Sophomores—81

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e Frank Dorn Barclay .....*Schenectady*.....29 Euclid Ave.
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e Douglas Brown .....*Freeport* .....Ψ Υ House
e Louis Chester Case .....*Guilderland* .....Ψ Υ House
e Beecher Chandler .....*Lake George*.....12 Gillespie St.
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e Lyman Allen Congdon .....*Jacksonville*.....Σ Φ Place
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e John Dalton James .....*Albany*.....Δ Υ House
e Frank Milton Jepson .....*Tippecanoe City, O*..1205 State St.
e Harry Merrill Johnson .....*Hornell* .....Δ Υ House
s Charles Albion Kenworthy .....*Amsterdam* .....Ψ Υ House
e Norman Wolfred Kittson .....*St. Paul, Minn.* .....Σ Φ Place
s John Kruesi .....*Schenectady*.....Σ Φ Place

e John Porter Lacey .....*Highland* .....Φ Δ Θ House
e George Edward Lewis, Jr. .....*Marion* .....Φ Δ Θ House
e John Vrooman Lewis .....*Hammondsport*..106 Nott Terrace
e Arthur Loeb .....*Schenectady*.....712 South Ave.
e William George Lutz .....*Schenectady*...914 Delamont Ave.
ls Donald Cameron MacLean .....*Cohoes* .....Σ Φ Place
e Walter Everett Maxwell .....*Schenectady*.....297 Broadway
e Andrew Stanton McCormick ...*Boonville*.....N. S. N. C.
s Alfred Cluett Meneely .....*Watervliet*.....Α Δ Φ House
e Floyd Raymond Milroy .....*Scotia*.....211 James St.
e Argemiro Moraes .....*Sao Paulo, Brazil*...602 Union St.
e Ralph D. Morgan .....*Buffalo*.....Δ Υ House
e Clayton Brown Mosier .....*Darien Center* ....211 Liberty St.
s William Alvin Mudge .....*Schenectady*.....233 Liberty St.
s Harry Froass Naumann .....*Oneida*.....Ψ Υ House
e Arthur Warren Noble .....*Brooklyn Heights*..702 Union St.
c Ernest Passage .....*Duanesburg*.....121 Nott Terrace
e Wright Poindexter .....*Hartford, Conn.* .....Χ Ψ Lodge
s Dalton Vane Sarvey .....*Elmira* .....Ψ Υ House
s Morris P. Schaffer .....*Schenectady*.....886 Emmet St.
e Le Roy Sand Schell, Jr. .....*Schenectady*.....1103 State St.
s Frank Robert Seigel .....*Tupper Lake*.....1104 Nott St.
s Arthur David Sherman .....*Albany* .....1104 Nott St.
s Charles Sherman .....*Albany*.....Κ Α Lodge
e Harvey Ray Shinaman .....*North Troy*.....129 Park Ave.
e Edgar Charles Shoup .....*Jersey Shore, Pa.* .....Albany
e Carlos Moreira da Silva .....*Rio de Janeiro, Brazil*..M. S. S. C.
e Carl Edwin Spaulding .....*Brooklyn*..135 Van Vranken Ave.
e Stephen Bond Story .....*Freeport*.....Ψ Υ House
e William Royal Taylor .....*Albany*.....708 South Ave.
e Archibald Scott Telfer .....*Hartwick*.....Φ Δ Θ House
e Arthur Tilley .....*Schenectady*.....101 Beaver St.
e Homer Michael Tinklepaugh ...*Sodus*.....Φ Δ Θ House
s Frederic D. Trapp .....*Hartford, Conn*.....Χ Υ Lodge
c George Octavius Truex.....*Bolton Landing*....222 Liberty St.
e Lansing Edwin Van Allen.....*Delmar*.R. F. D. No. 1, W. Albany
c Raymond Van Santvoord .....*Cohoes*.....Ψ Υ House

e Roblee Hamilton Vaughan .....*Saratoga Spa* .....ΔΦ House
s Warren Chase Vosburgh .....*Voorheesville*.....B. I. W. Lodge
e George Wadsworth .....*Buffalo* .....A Δ Φ House
e William Winslow Wait .....*Schenectady* .....A Δ Φ House
e John Michael Wallace .....*Schenectady*....353 McClellan St.
e Stanley Lincoln Walworth .....*Owego*..... ..A Δ Φ House
e James Robert West .....*Sodus*.....Φ Δ Θ House
s Morgan L. Williams .....*Medway*.....112 Furman St.
e Brooks Frank Wood .....*Solisburg Center*....Φ Γ Δ House

Freshmen—107

Summary of Students, Union College

Candidates for the Master's Degree	12
Graduate Students	6
Seniors	56
Juniors	77
Sophomores	81
Freshmen	107
	339
Counted twice	1
Total	338

STUDENTS OF THE ALBANY MEDICAL COLLEGE

Fourth Year Class

Martin Joseph A'Hearn ..... Saratoga Springs
Antonio Martinez Alvarez..... San Juan, Porto Rico
La Verne Adelbert Bouton ..... Fultonville
Milton Gardner Burch..... North Adams, Mass.
Michael Ercole De Luca ..... Troy
Ray Manier Eaton ..... North Adams, Mass.
Percy Henry Finch ..... Broadalbin
Walter Clayton Fox ..... Troy
Frederick Joseph Garlick ..... Fall River, Mass.
Bertram Wesley Gifford ..... Masonville
Clayton Longueville Gifford ..... Valley Falls
George Mills Glenn ..... Albany
James Joseph Hart ..... Rensselaer
Irwin Johnston ..... Watervliet
Frederick Louis Kreicker ..... Troy
Arthur Krida ..... Schenectady
Harold Arthur Lucas ..... Rensselaer
Thomas William Maloney ..... Waterloo
William Henry Mason ..... Gloversville
Charles Edward Maxwell ..... Saratoga
William Edward McCormick..... Albany
John Ashby McElwain ..... Cohoes
Maurice James McGrath ..... Ogdensburg
Walter Daniel McKenna ..... Troy
Horace Clifford Montgomery..... Waddington
Frank Mathias Neuendorf ..... Albany
Henry Joseph Noerling..... Albany
Edmond Joseph O'Donnell..... Albany
Abraham Lewis Olshansky..... Albany
Chauncey Butler Packard..... Troy
Augustus Charles Post..... Catskill
Ralph Baker Post..... Catskill
Peter Francis Purcell ..... Salem

Francis Bernard Quinlan ..... Glens Falls
William Francis Rafferty ..... Rensselaer
Hiram Burdette Riggs ..... Canajoharie
Scott Booth Schleiermacher ..... Bloomingburg
Emil John Senn ..... Schenectady
William Thomas Shields, Jr. ..... Albany
William James Sweeney ..... Newburg
Abraham Phineas Terk ..... Troy
Arthur Eddy Wells ..... Albany
Arthur Hastings Wheeler ..... Troy
Melvin Thomas Woodhead ..... Amsterdam

Fourth Year Students—43

Third Year Class

Max Alonzo Almy ..... Corning
Horace Edward Auringer ..... Cohoes
Bertran Truman Baker ..... Warrensburg
Clifton Bogardus ..... Catskill
John Lawrence Both ..... Lawrence
Joseph Henry Bowers ..... Albany
John Joseph Cahill ..... Hudson Falls
Alton Brooks Daley ..... Coxsackie
Sol Charles Davidson ..... Rochester
John Lounsberry Edwards ..... Randall
George Augustine Green ..... Mechanicville
Paul Pattengill Gregory ..... Welcome
Walter Robert Grunewald ..... Gloversville
John Duncan Gulick ..... Cranbury, N. J.
Vasileos Michael Koundourianes, B. S. ..... Albany
Royal Estabrooks LaGrange ..... Glens Falls
Albert Lenz ..... Johnstown
Norman Howe Liberty ..... Ticonderoga
Charles Immanuel Loeble ..... Troy
William Edgar Low, Jr. ..... Catskill
Donald Angus MacDuffie ..... Olean
Domenico Carlantonio Mauro ..... Gloversville

William Thomas McCormick ..... Greenwood
Joseph Ambrose McPhillips ..... Glens Falls
Ward Winthrop Millias, Ph. B. ..... Valley Falls
James Henry Mitchell, Jr. ..... Cohoes
Floyd Hazard Moore ..... Herkimer
Clarence Edmund Mullens ..... Albany
Homer Hollett Oaksford ..... Gloversville
Daniel Francis O'Keeffe ..... Hadley
Daniel Tobias Read ..... Monck's Corner, S. C.
Fred Lester Ritter ..... Albany
Michael Augustine Rogers ..... Schuylerville
William Henry Seward ..... Amsterdam
George Aaron Sharp ..... Westfield, Mass.
Charles Edward Stott ..... Albany
Sterling Wallace Todd ..... Hyde Park, N. J.
William Trotter ..... Troy
*James John Walsh ..... Waterloo
Floyd Alberti Weed ..... Catskill
Jerry West ..... Gallupville
*Arthur Hastings Wheeler ..... Troy
Ira Coudict Whitehead, Jr. ..... Albany

Third Year Students—43.

Second Year Class

William Alfred Ackroyd ..... Albany
Wesley Mason Adams ..... Westford
*Francis Argus ..... Buffalo
Glen Beecher ..... Granville
Morris Bryan Beecroft ..... Schaghticoke
Orvis Adoniram Brenenstuhl ..... Petersburg
Darwin Alfred Bruce ..... Albany
John Leonard Byrnes ..... Schenectady
William Henry Casey ..... Troy
Garrett Marcellus Clowe ..... Schenectady
Rufus Baker Crain ..... Richfield Springs

*Matriculant only.

Nathaniel Crost ..... Saratoga Springs
Burke Diefendorf ..... Fort Plain
Jacob Drooz ..... Albany
Dwight Guilford Dudley ..... Maine
Harold La Forrest Ellis ..... Westfield, Mass.
Albert Stuart Ferguson ..... Schenectady
Hugh Vincent Foley ..... Watervliet
George Victor Genzmer ..... Pittsfield, Mass.
Elmer Ray Gladstone ..... Shavertown
Hugh Sewell Gregory ..... Horseheads
Raymond Hensel ..... Buffalo
Edward Bowen Houghton ..... Albany
Guy Swineburne Houghton, A. B. ..... Albany
Harry Smith Howard ..... Albany
Alson Joy Hull ..... Williamstown, Mass.
Eugene Fellner Hull ..... Berlin
Ray Holly Humphrey ..... Rensselaer
William James Jones ..... Amsterdam
Whitney Hotaling Joyce ..... Unadilla
William Herman Ladue ..... Beekmantown
Roy Ludlum Lippincott ..... Campbell Hall
John Wellington Mambert ..... Churchtown
Schuyler McCulloch Martin ..... Albany
William Frank Mast ..... Buffalo
Raymond Francis McAloon ..... Keeseville
Michael Edward Nolan ..... Eagle Bridge
Henry Bernard O'Keeffe ..... Luzerne
Elmer Harrison Ormsby ..... South Glens Falls
John Stewart Parker ..... Oneonta
Robert Edward Plunkett ..... Troy
Francis Anthony Quinlan ..... Allegany
William Carl Rausch, Jr. ..... Albany
Conrad Aloysius Rissberger ..... Albany
Ernest Charles Schultz ..... Schenectady
Woodard Shaw ..... West Hebron
Walter Joseph Smith ..... Port Leyden
Axel Fridolf Swanson ..... Southampton, Mass.

John Daniel Tidabeck ..... Bloomfield, N. J.
Harold Dwyer Tobin ..... Chateaugay
Guy Brownell Van Alstine ..... Canajoharie
Frank John Williams ..... Utica
‡Louis Frederick Yavits ..... Schenectady

Second Year Students—53.

First Year Class

David Wiltsie Beard ..... Cobleskill
John Edgar Brewer ..... North Adams, Mass.
John Peter Byrnes ..... Pittsfield, Mass.
Edward James Callahan ..... Mechanicville
Daniel Francis Carmody ..... Albany
George Clay Carter ..... Albany
Clarence Cohen ..... Hempstead
John Kenneth Crandall ..... Wappingers Falls
George Jacob Culver ..... Schenectady
Daniel Sylvester Cunning ..... Troy
Arthur Manning Curran ..... North Adams, Mass.
Patrick Joseph Daly ..... Richfield Springs
Frederick Graham Decker ..... Rensselaer
Frank Edgerton Deeds ..... Schenectady
Harry Depan ..... Indian Lake
William Francis Donohue ..... Amsterdam
Albion James Fitzgerald ..... Albany
Frank Furlong ..... Highland
John Warren Gard ..... Auburn
Clarence Gardinier ..... Schenectady
Parker Arthur Groff ..... Rome
Robert Wilhelm Helm ..... Saratoga Springs
†William Joseph Hickey ..... Albany
John Thomas Hopkins Hogan ..... Troy
*Lloyd Louis Hollenbeck ..... Catskill
Calvin Charles Holmes ..... Albany
William Patrick Howard ..... Albany

‡ Special course
† Died October 23, 1910
* Matriculant only

Elwin Horton Huntington.....Hopewell Junction
Harry Vincent Judge .....Albany
Clarence Giles Kirby .....Nassau
Wilbur Foster MacDonald .....Schenectady
James Breese McCormick.....Troy
John Stoddard McCormick, Ph. G. .....Albany
*James McDermott, Jr. ....Schenectady
Thomas Hugh McGrail .....Albany
John Devring McGuire.....Arctic, R. I.
Burton Carr Miller, B. S. .....Albany
Rollin Huntington Moody .....Saratoga Springs
Floyd Guy Nellis.....Boonville
Vincent John Thomas O'Neill.....Highland Falls
Julius Joseph Padula.....Albany
Harry Day Parkhurst.....West Winfield
Charles Adelbert Perry.....Rome
Floyd Grendon Reed.....Albany
Robert Reid, Jr. .....Schenectady
Harry Stephen Reynolds .....Schenectady
Edward Louis Robbins .....Syracuse
Arthur Grant Rodgers, Jr. ....Watervliet
John Aloysius Russell, Jr. .....Albany
James Israel Schoonmaker.....West Coxsackie
Frank Arthur Searle .....Southhampton, Mass.
William Aloysius Smith.....Amsterdam
Theron Smith .....Newburg
Lewis Jeriah Smith .....Westfield, Mass.
Bertrame Shurter Ten Hagen.....Rosendale
Leo Ross Tighe.....Cohoes
William Bernice Davidson Van Auken .....Voorheesville
Gregori Osepovitch Volovic .....Louisville
William Irving Walsh .....Troy
John Waluk .....Amsterdam
Joseph Weschler .....Oriskany
Willard Elmer Wheelock.....Canajoharie
Cecil Charles Whittemore .....Albany
Fred De Grande Wilson.....Downsville

*Matriculant only

Laurence Randolph Worrell.....Greene
Harold Greene Wright .....Mt. Vision
Harry Theodore Wygant.....Watervliet
First Year Students—67.

Summary of Students, Albany Medical College

Fourth Year Students	43
Third Year Students	43
Second Year Students	53
First Year Students	67
Total	206

STUDENTS OF THE ALBANY LAW SCHOOL

Seniors

Alexander Aaronson ..... New York City
George W. Allen ..... Schenectady
Charles S. Briggs ..... Canastota
Clarence O. Boyd (Yale) ..... Adams
James H. Burns (Niagara) ..... Ogdensburgh
Earl Barkhuff ..... Altamont
Bert. Brower (Cornell) ..... Palatine Bridge
Hazel M. Cole ..... Spingfield, Mass.
Norman W. Cole ..... New York City
John J. Conway ..... Cohoes
Philip J. Cirillo ..... Troy
F. Cuthill Calderwood ..... Johnstown
James A. Clark ..... Rutland, Vt.
Wyllys A. Dunham ..... Springfield Centre
James M. Dunleavy ..... Saratoga Springs
Frank T. Dwyer ..... Cazanovia
Frank J. Duffy ..... Providence, R. I.
Arthur S. Evans (Hamilton) ..... Lee Centre
C. Roscoe Failing (Union) ..... Palatine Bridge
Pascasio Fajardo, Jr. ..... Mayaguez, P. R.
Jose A. Fajardo ..... Mayaguez, P. R.
Benj. F. Feinberg ..... Plattsburgh
Chauncey S. Fish ..... White Plains
Nelson A. Foot ..... Pittsfield, Mass.
Ezra S. Ford ..... La Fargeville
J. Sidney Forsyth ..... Watervliet
Ezra S. Ford ..... La Fargeville
Benj. M. Freeman ..... Mt. Vernon
Henry F. Gardner ..... Hortonville
Doane S. Guardinier ..... E. Springfield
Lynn G. Goodnough ..... Cornwall
Charles W. Gould ..... Milford, Mass.
Leslie P. Grant ..... Stamford

Woodward W. Guile.....Utica
F. Andrew Hall.....Saratoga Springs
Emory A. Hamblin.....Albany
Gerald F. Harrington.....Saratoga Springs
Neil G. Harrison.....Greene
Milton B. Ignatius .....Troy
Duncan B. Kaye.....Troy
John E. Kelly.....Schenectady
Mitchell A. Kohn.....Schenectady
James W. Liddle .....Schenectady
Daniel E. Lorentz.....Gloversville
Emil F. Maley (Washington and Lee).....Braddock, Pa.
Ethan A. Mapes.....Birdsall
Charles F. McMahon .....Schuylerville
J. Russell Meaney.....Albany
Loomis W. Mulford.....Unadilla
James B. Mulholland.....Troy
T. Carl Nixon.....Rochester
Roy H. Northup.....Morrisville
John J. O'Connor.....Auburn
Albert S. Poventud (Virginia) .....Ponce, P. R.
Nicholas G. Powers.....Utica
Halsey L. Race.....Rochester
Hugh Reilly (Georgetown) .....Albany
Samuel Reichler .....Utica
Fred J. Roberts.....Atlantic, Iowa
Harry E. Russell.....Glens Falls
Francis L. Smith.....Schenevus
Joseph E. Salichs (Pennsylvania) .....Ponce, P. R.
Carl S. Salmon.....Potsdam
John W. W. Searle.....Watervliet
Arthur B. Shear .....Catskill
William Sheehy.....Milbrook
John T. Sweeney, Jr. .....Saratoga Springs
J. Wilder Tasker (Syracuse) .....New Bedford, Mass.
Harold W. Turner .....Waterford
Alvin Ury, (Union) .....Schenectady

Ralph J. Ury (Union) ..... Schenectady
Vernona A. Vrooman ..... Albany
E. Deane Vincent ..... Troy
John C. Watson ..... Albany
Wayne H. Whitman (Brown) ..... Washington, R. I.

Seniors—75

Juniors

Albert A. Arnold ..... Kingston
Pedro Baiges ..... Anasco, Porto Rico
Bierce Bailey (Williams) ..... Troy
Charles Bauer ..... Geneseo
John Beakley ..... Johnstown
James A. Burnham, Jr. (Tufts) ..... Ballston Spa
William W. Campbell ..... Schenectady
Albert E. Carmichael (Union) ..... Schenectady
Plinio L. Castro ..... Cabo Rojo, P. R.
Ralph E. Comstock ..... Nassau
Harry G. Coplon (Union) ..... Schenectady
John J. Chartres (Hobart) ..... Geneva
Alexander Clapp ..... Rensselaer
Charles G. Coffin, Jr. ..... Catskill
Francis H. Collins ..... Saranac Lake
Emory F. Crapeau ..... Arctic, R. I.
Upiano Crespo, Jr. ..... Anasco, P. R.
John T. E. Davis ..... Albany
J. O'Day Donahue ..... Albany
G. C. Donohue, (Villanova) ..... Dalton, Mass.
Philip H. Donnelly (Holy Cross) ..... Albany
Joseph F. Driscoll (Brown) ..... Ballston Spa
Orville R. Dunn (Yale) ..... Champlain
Peter D. Dusenberre ..... Florida
M. Fajardo, Jr. ..... Mayaguez, P. R.
W. Shepard French (Yale) ..... Saratoga Springs
Harry Gottesfeld ..... New York City
John F. Heffernan (Notre Dame) ..... Williston, No. Dakota

George E. Hill.....Cohoes
Park Holland .....Albany
Frank Hurley .....Glens Falls
J. Smith Jacobs .....Troy
Maximilliam J. Jasoloski .....Schenectady
David I. Jersky .....Troy
A. F. Johnson (Augustina) .....Falconer
James E. Kelly .....Troy
J. Franklin Kilmer.....Ballston Spa
Edward A. Lawless.....New London, Conn.
Francis V. V. Leary.....Greene
Gardner V. V. Littell (Hobart) .....Gloversville
Edward M. Lotridge .....Fonda
H. J. Mather .....Schenectady
Joseph A. McGraw.....Albany
John P. McNamee.....Troy
Ernesto Menendez .....Mayaguez, P. R.
William F. Minnock.....Coeymans
Arthur L. Mepham .....Ontario
Harold Murdock .....South Schroon
George M. Murray .....Providence, R. I.
Raymond F. Nichols (Syracuse) .....Van Etten
Thomas F. O'Bryan .....Corning
Clara Pritchard .....Tivoli
Clarissa Pritchard.....Tivoli
A. B. Peterson.....Jamestown
Richard F. Rath.....Binghamton
Howard J. Rielly .....Mechanicville
Charles F. Saunders.....Providence, R. I.
Edward N. Scheiberling .....Albany
F. W. Seeley .....New Suffolk
Romaine Shepard .....Lawrenceville
William T. Shields (Holy Cross) .....Stillwater
William Sheehy .....Milbrook
S. B. Smith (Dartmouth) .....Troy
B. O. Snyder .....Allegany
John R. Stewart.....Watervliet

Harold W. Thomas (Clark) ..... Keeseville
John F. Thomas (Williams) ..... Troy
Horace E. Vedder (Union) ..... Schenectady
Holland B. Williams (Hamilton) ..... Corning
Harry E. Winn ..... Greenfield, Mass.

Juniors—70

Summary of Students, Albany Law School

Seniors	75
Juniors	70
Total	145

STUDENTS OF THE ALBANY COLLEGE OF PHARMACY

Senior Class

Samuel Aker.....Albany
Harry Wheeler Baker.....Glens Falls
Roy Edward Baker.....Potsdam
John Richard August Balje, Jr.....Johnstown
Charles Hamblin Barbour.....Mechanicville
Archibald Walling Billings.....Stowe, Vt.
Leon Holmes Bonham.....Tioga Center
William Clements.....Ballston Spa
William Henry Covey.....Chatham
Floyd Ivan Davey.....Parish
William Jay Dromey.....Canton
Harold Scherer Eggers.....Cohoes
Bernard Ettinger.....Schenectady
John Joseph Goodhart.....Ogdensburg
George Theodore Gramp.....Hudson
Edward Joseph Hamman.....Schenectady
Percy Irving Hisert.....Schenectady
William Albert Humphries.....Delhi
Frank Wesley Isles.....Mechanicville
William Guier Kapp.....Rensselaer
Walter Charles Klapper.....Schenectady
John Charles Konieczny.....Schenectady
Daniel Henry Krieger.....Poughkeepsie
Walter Henry Lathrop.....Schenectady
Harry Robert Lawrence.....Albany
William Morehead Lithgow.....Albany
George Augustin Molony.....Schenectady
Daniel Louis Myers.....Schenectady
Fenton Byron Neal.....Cherry Valley
Bernie Leon Nichols.....Essex Junction, Vt.
Arthur William Northover.....Johnstown
Clarence Edward Ostrander.....Albany
John Wesley Pangburn, Jr.....Rensselaer
Louis Clemence Potter.....Chestertown

William Vincent Reilly.....Penn Yan
John Harry Robbins .....Kellettville, Pa.
Alice Mary Robertson .....Cambridge
Fred Salvione .....Amsterdam
Grover Buell Sanford .....Arkville
Claud Hamilton Selleck.....Ontario
Helen Florentine Sheehy .....Little Falls
Henry Cyrus Sherman.....Oneonta
William Augustus Snyder.....Mechanicville
Manser Templeton Stone .....Northfield, Vt.
Henry Hiscox Swink .....Troy
Theodore DeWitt Wands .....Norwich
Cyrus Grant Watson.....Homer
Carl Augustus Weber .....Kingston
Ida Fischer Weber .....Kingston
Charles Jeremiah Woodruff .....Fort Ann

Seniors—50

Junior Class

Himon Alpert .....Dannemora
Dennis Peter Amo.....Massena
Joseph Arthur Barhydt .....Schenectady
Roy Ezekial Bates.....Gloversville
Ralph Paul Branche .....Gloversville
Thomas James Brierton.....Watervliet
Vernon Grant Burr .....Norwich
Harold William Calder.....Freehold
Stanley Hume Calkins.....Cohoes
Raymond Thomas Carey.....Greenwich
Alfred Nelson Christeson.....Schenectady
Harold Frank Cleveland.....Cambridge
Harold John Cusson.....Hoosick Falls
Franklin James Demo .....Massena
Martin Cleveland Dyer.....Schenectady
Lawrence Joseph Early .....Schenectady
Nelson Robinson Frasier.....Glens Falls

Joseph Leo Fullem.....Frankfort
Clark Jesse Gerowe.....Unadilla
Howard J. Hall.....South Schroon
John Luverne Hemstead.....Waterford
Julia May Higgins.....North Creek
William Bird Howe.....Binghamton
Marcus Henry Hall.....Hinesburg, Vt.
LeRoy Walter Hyde.....Plattsburg
Leo Leland Kane.....Greenwich
Louise Dorothy Locble.....Troy
Charles Maples MacGibbon.....Walton
Harry Wilson Maybee.....Roscoe
Thomas Ernest McClelland.....Saranac Lake
John James McDonnell.....Sheffield, Mass.
Dwight Henry Mosher.....Hudson
Augustus Tremaine McKinstry.....Dolgeville
John Henry Northover.....Johnstown
Delos Henry Norton.....Troy
John Francis O'Leary.....Albany
Alberto Peon.....Merida, Yucatan
Wallace Hudson Pierce.....Westport
James William Pierson.....Schenectady
Francis Joseph Real.....Green Island
Sayles Caleb Robinson.....Troy
Clarence Edward Schneider.....Troy
Frank James Smith, Jr.....Albany
Patrick Joseph Smith.....Greenwich
Victor Lee Smith.....South Horicon
Maude Elizabeth Steitz.....Hudson
John Thomas Thomson.....Delhi
Kenneth Ward Unsworth.....Binghamton
Howard William Van Loan.....Chatham
John Frederick Walden.....Williamstown, Mass.
Sidney Arthur White.....Windsor
Louis Judson Woodworth.....Big Hollow
Herbert Ellsworth Wright.....Stowe, Vt.

Juniors—53

Summary of Students, College of Pharmacy

Seniors	50
Juniors	53
Total	103

SUMMARY OF STUDENTS, UNION UNIVERSITY

Union College	338
Albany Medical College	206
Albany Law School	145
Albany College of Pharmacy	103
	792
Counted twice	2
Total	790

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